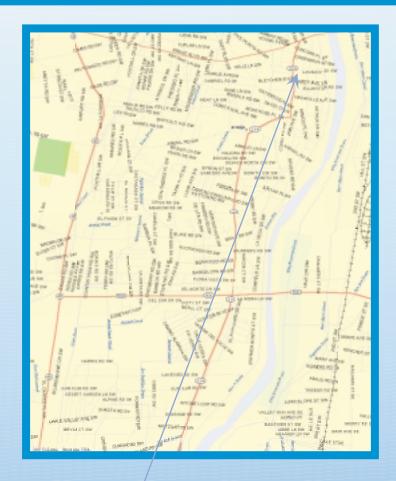
Hydrogeologic Investigation

Old Horn Site 430 ISLETA BLVD., SW

> ALBUQUERQUE, BERNALILLO COUNTY, NM

May 16, 2001





repared For:

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May 16, 2001

Mr. Nolan Bennett Environmental Health Scientist Bernalillo County Environmental Health Department 600 Second St. NW, Suite 500 Albuquerque, NM 87102

RE: Transmittal of Hydrogeologic Investigation Report 430 Isleta Blvd. SW, The Old Horn Site; NMED/USTB Facility ID No. 28600 Contract Control No. 980473

Dear Nolan:

Please find included herewith one copy of the Hydrogeologic Investigation Report for the Old Horn site. Recommendations for further action include the preparation of a Tier 2 evaluation to determine if any additional remedial efforts are necessary at the site, implementing a remedial strategy to mitigate the extensive soil hydrocarbons in the Site vicinity, and continued quarterly ground water monitoring.

Please do not hesitate to contact the undersigned if you have any questions or comments regarding this matter.

Respectfully submitted, FAITH ENGINEERING, INC.

Stuart E. Faith, PE, CS #80 President

cc. w/ encls. Mr. Tom Leck - NMED/USTB

Mr. Bill Brown - TPA

HYDROGEOLOGIC INVESTIGATION REPORT

OLD HORN ISLETA SITE

430 ISLETA BLVD. ,SW ALBUQUERQUE, NEW MEXICO

FAITH ENGINEERING, INC.

TECUMSEH PROFESSIONAL ASSOCIATES, INC.

MAY 16, 2001

Submitted to:

Mr. Nolan Bennett Environmental Health Scientist Bernalillo County Environmental Health Department

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1.0 EXECUTIVE SUMMARY

On behalf of the Bernalillo County Environmental Heath Department (BCEHD), Faith Engineering, Inc. (FEI) and Tecumseh Professional Associates, Inc. (TPA) performed a Hydrogeologic Investigation (HI) at the former Old Horn-Isleta Site (the Site) located at 430 Isleta Blvd., SW in Albuquerque, New Mexico (Figure 1). The HI was performed to evaluate the magnitude and extent of hydrocarbon releases originally discovered in 1991 when gasoline odors were detected in a private water supply well located immediately south of the facility. The Site was the location of a series of gasoline service stations operating from the 1940's through the mid-1980's when the remaining USTs were reportedly removed from the Site (Figure 2).

Initially, Western Technologies, Inc. (WTI) was retained by Mr. Calvin Horn to complete an Onsite investigation at the Site. In January of 1992, WTI advanced and sampled three monitor wells and over 20 shallow soil borings in the Site vicinity which revealed the presence of an extensive soil hydrocarbon plume with moderate levels of groundwater benzene, toluene, ethylbenzene and total xylenes (BTEX). Although many borings were installed during this investigation, no laboratory samples were collected and boreholes were not continuously cored.

In early 1992, the NMED placed the Old Horn Site on its list of state-lead Groundwater Protection Act (GWPA) sites. Monteverde Environmental Consultants, Inc. (Monteverde) was retained by the NMED to complete investigation activities and design and install a remediation system. Between 1992 and 1994, Monteverde installed and sampled additional monitor wells and soil borings in the Site vicinity. During this same period, Monteverde reportedly excavated approximately 150 yards³ of soil from the former tank excavation area and installed a passive venting/active sparging in-situ reclamation system in the southernmost portion of the Site (Figure 3). This system was apparently never operated.

Intera, Inc. (Intera) was retained by NMED to replace Monteverde in late 1994. Intera conducted a more detailed site investigation installing additional wells and soil borings, which provided a more comprehensive understanding of the Site. Their investigations focused on the southern half of the Old Horn Site. Intera conducted a short-term SVVSTM pilot test at the Site in November 1994. Based on the results of the pilot test, Intera installed 14 SVVSTM well nests and associated subgrade piping in the southern portion of the Old Horn Site in 1995 (Figure 3). As with the Monteverde reclamation system, these wells were never operated.

Following installation of the SVVSTM system, it was reported that two groundwater sampling events were conducted at the Site; one in 1996 and one in 1998. These data document reductions in dissolved phase BTEX and light non-aqueous phase liquids (LNAPLs) in select wells.

The objective of FEI/TPA's HI was to fully characterize the current subsurface hydrogeologic regime and the vertical and horizontal extent of soil and groundwater impacts. The HI included four primary tasks: 1) review of NMED files, site mapping and photography, and historic soil and groundwater data, 2) re-sampling and analysis of groundwater from previously installed monitor wells, 3) advancement and sampling of new soil borings, monitor, and pilot wells; and 4) completion of this summary HI Report.

Initial FEI/TPA groundwater sampling for the 1st quarter of monitoring took place on September 21, 2000. TPA drilling activities took place at the Site between October 12, 2000 and February 6, 2001. A total of 42 boreholes were advanced in the Site vicinity. Nine were completed as 2-inch diameter monitor wells, two as 4-inch diameter monitor/vacuum extraction (VE) wells, six as multiple completion pilot test wells, one as a 2-inch diameter air sparging/deep completion well, and one as a subsurface groundwater flow sensor. The remaining 23 boreholes were plugged and abandoned with bentonite, bentonite-cement grout and native material to the land surface (Figure 2). Groundwater sampling of the newly installed wells took place on March 23, 2001.

Retrieved samples collected from boreholes indicate sediments between the ground surface and approximately 25 feet below surface grade (bsg) can be subdivided into 3 primary laterally extensive Lithologic Units based on general grain size distribution (Figures 4 and 5). Lateral and vertical facies changes are common within each of these Lithologic Units and individual subunits tend to pinch out laterally.

Lithologic Unit I extends from the ground surface to approximately 5-9 feet below surface grade (bsg) and is comprised primarily of lower permeability clayey sands, clayey silty sands, clays, and silts with lesser amounts of silty sands and sand. Lithologic Unit II extends from the base of Lithologic Unit I to approximately 10-11 feet bsg and is composed primarily of well sorted fine to medium grained unconsolidated sands with gravelly or coarser grained sand-rich intervals. Lithologic Unit III extends from the base of Lithologic Unit II to below 25 feet bsg and can be divided into two primary subunits. Lithologic Unit IIIa is composed of moderate to poorly-sorted fine to coarse grained sands with gravelly intervals. A prominent 2 to 4-foot thick fine to medium grained well sorted sand subunit (Lithologic Unit IIIb) is often located within Lithologic Unit IIIa at depths ranging between 13 to 19 feet bsg (Figure 4).

During the Investigation, groundwater saturated conditions were encountered at a depth of approximately 12-13 feet bsg. Evaluation of groundwater level measurements indicated the potentiometric surface sloped to the southwest and south at a gradient of between approximately 0.004 and 0.002 feet/foot on September 21, 2001 (Figure 6). The unlined Atrisco Lateral ditch is located along the eastern and southern margins of the subject property. This surface hydrologic feature appears to affect shallow groundwater flow locally and to have restricted soil and groundwater contaminant migration at the Site (Figures 7, 8, 9, and 10). Previous groundwater measurements during the early to mid-1990's suggested groundwater flow over the last decade were also observed at other nearby leaking UST sites during this project.

One group of former USTs was reportedly located on the south side of the main Site building. It is unknown if additional tanks were also located at the subject property. Gasoline to diesel range hydrocarbon impacts to soils in the immediate vicinity of the Site were found over a very large area (Figures 5, 7, 8, and 9). Spatial analysis of the horizontal and vertical extent of both total ionizable volatile compounds (TIVC) headspace concentrations and total petroleum hydrocarbons (TPH) concentrations suggest two primary release areas. Hydrocarbon releases from the former UST storage and delivery systems in the southern portion of the Site combined with probable surface spills appear to have impacted soils and groundwater primarily in the release area and west of the Site. A second smaller release area appears to have been located in the northern portion of the Site in the vicinity of boreholes B-6 and B-12 (Figure 8). Based on the distribution of the northern hydrocarbons it is likely that surface and possibly subsurface spills occurred. Both release areas have co-mingled over time.

Analysis of laboratory TPH chromatograms indicate the majority of hydrocarbons in soils at the Site are in the C₈ to C₁₄ carbon ranges, which are typically associated with highly weathered gasoline or kerosene fuels. At most sample locations, the majority of the BTEX compounds are no longer present. Locally, soil samples contain hydrocarbons extending up into the C₂₂ to C₂₆ carbon ranges, which are typically associated with diesel fuel and motor oil. Based on a limited knowledge of past site use, we believe that the primary hydrocarbon at the Site is highly weathered gasoline. TPH_{gasoline range} and TPH_{kerosene+ range} levels in retrieved soil samples were measured at concentrations of up to 17,000 and 5,400 ppm, respectively. Soil samples analyzed for TIVC exceeded 1,000 parts per million/volume (ppm/v) in 28 of the 42 boreholes advanced in the Site vicinity. TPH levels exceeding 100 ppm extend across an area approximately 270 feet by 300 feet across. TIVC levels exceeding 100 ppm/v extend across a slightly larger area approximately 280 feet by 320 feet in size. Hydrocarbon saturated or "highly contaminated" soils were identified in many of the boreholes advanced in the southern portion of the Site during this investigation (see Borehole logs, Appendix A).

During the early to mid 1990's groundwater impacts at the Site were characterized by moderate to low levels of dissolved-phase BTEX and naphthalene with localized LNAPL accumulations in monitor wells MW-1B and MW-10. The presence of 1,2 dichloroethane (EDC), 1,2 dibromoethane (EDB) and methyl tertiary butyl ether (MTBE) has not been documented at the Site. Groundwater sample data from the two most recent sampling events indicate non-detect to locally moderate levels of BTEX and naphthalene in monitor well samples (Figure 10). Maximum benzene and total BTEX concentrations were measured at 970 and 4,200 parts per billion (ppb), respectively, in samples collected from well VM-1.

Inorganic groundwater quality samples collected from monitor wells indicate moderate levels of bicarbonate as the primary inorganic groundwater constituent at the Site. Phosphate, iron, and nitrate concentrations were identified at low levels. Groundwater samples exhibited a slightly acidic to slightly basic pH (6.47 to 7.81).

An estimated 11,000 cubic yards of hydrocarbon contaminated soil (including vapor-phase hydrocarbons) is present in the Site vicinity with approximately 15,000 cubic yards of non-impacted overburden. Residual TPH spill mass estimates suggest that approximately 40,000 pounds (lbs.)/6,300 gallons of TPH_{gasoline-diesel} is still present in the immediate Site vicinity (see Appendix C).

The vertical and horizontal extent of soil and groundwater hydrocarbons exceeding WQCC and USTR standards has been defined. Based on existing data, FEI/TPA recommend completion of a Tier Two RBDM evaluation at the Site and implementation of an aggressive comprehensive remedial strategy. Based on the planned Phase I-Isleta right-of-way widening, three primary remediation strategies appear to be potentially useful at the Site. These include: 1) excavation and disposal of TPH-impacted soils; 2) in-situ vacuum extraction/air ozone injection; and 3) insitu chemical oxidation. Remedial actions should be followed by implementation of a long-term groundwater monitoring plan to document plume attenuation following implementation of one or more of the above mentioned reclamation strategies.

2.0 INTRODUCTION

2.1 BACKGROUND/SITE HISTORY

The Former Old Horn-Isleta Site (the Site) is located at 430 Isleta Blvd., SW in Albuquerque, New Mexico (see Figure 1) and is currently the location of Ruli's Automotive, an automobile repair facility. Hydrocarbon releases were first discovered in the Old Horn Site vicinity when Mr. C.O. Clark, the owner of a mobile home park located immediately south of the Site, complained of gasoline odors in his shallow water supply well. Subsequent sampling of the well by the Albuquerque Environmental Health Department (AEHD) in 1991 identified trace levels of BTEX compounds in the well. The Site was the location of a series of automobile service stations operating from the 1940's through the mid-1980's when the remaining USTs were reportedly removed from the Site.

Initially, Western Technologies, Inc. (WTI) was retained by Mr. Calvin Horn to complete an On-Site Investigation at the Site. In January of 1992, WTI advanced and sampled three monitor wells and over 20 shallow soil borings in the Site vicinity which revealed the presence of an extensive soil hydrocarbon plume with moderate levels of groundwater benzene, toluene, ethylbenzene and total xylenes (BTEX). Although many borings were installed during this investigation, no laboratory samples were collected and boreholes were not continuously cored.

In early 1992, the NMED placed the Old Horn Site on its list of state-lead Groundwater Protection Act (GWPA) sites. Monteverde was retained by NMED to complete investigation activities and design and install a remediation system. Between 1992 and 1994, Monteverde installed and sampled additional monitor wells and soil borings in the Site vicinity. Exact locations for these drill holes could not be determined by FEI/TPA based on available site maps. During this same period, Monteverde reportedly excavated approximately 250 yards³ of soil from the former tank excavation area and installed a passive venting/active sparging in-situ reclamation system in the southernmost portion of the Site (Figure 3). An as-built report for this system was not identified in the NMED case file; however, the Monteverde system is discussed later by NMED's subsequent consultant, Intera. This system was apparently never operated. Additionally, Intera reported that Monteverde also installed four pilot test wells, which were also apparently not operated. No evidence of these pilot test wells was observed during FEI/TPA's site investigation activities.

Intera was retained by NMED in late 1994. Intera conducted a more detailed site investigation installing additional wells and soil borings, which provided a more comprehensive understanding of the Site. Their investigations focused on the southern half of the Old Horn Site.

Intera conducted a short-term SVVSTM pilot test at the Site in November 1994. The pilot test consisted of installation and operation of a single dual-completed sparge and vent well (shown as #7 on Figure 3). Four 1" diameter galvanized iron pipes were driven into the ground at distances of 8', 19', 23', and 30' from Well Nest #7. The location of these wells and their construction is unknown. Intera calculated a radius of influence based on their pilot test of 45 to 55 feet. Our analysis suggests a more conservative effective zone of vacuum influence (EZVI) for the test well of approximately 30 feet. Off-gas emission concentrations based on laboratory analysis of a single recovered vapor sample were approximately 16,000 ug/l (3700 ppm/v) of Total Hydrocarbons. Total BTEX concentrations amounted to less than 400 ug/l (90 ppm/v).

In 1995, Intera installed 14 SVVSTM well nests and associated subgrade piping in the southern portion of the Old Horn Site (Figure 3). As with the Monteverde system, these wells were never connected to an above-ground treatment unit and have not been operated. Inspection of the Site by FEI/TPA in 1999 identified the primary subsurface PVC manifold headers for the system in the southernmost portion of the Site. Review of the Intera Reclamation Proposal confirms that the treatment wells are manifolded in such a way that each "leg" of the system can be adjusted, however, individual well control is not possible.

Each sparge and vent well nest is reportedly completed with the sparge and vent well in the same borehole. Bentonite seals reportedly isolate the screened intervals of each well cluster. Surface completions allowing access to the SVVS[™] wells were not constructed and all wells and piping are subgrade. Vent wells are constructed of 2" diameter schedule 40 PVC with 0.02" slot screen and sparge wells are constructed of 2" diameter schedule 40 PVC with 0.01" slot screen. According to the Intera Reclamation Proposal, the well screens are backfilled with crushed gravel. Horizontal piping in the vicinity of the manifold valving is 3" diameter PVC. The current condition of the subgrade treatment system is unknown.

Following installation of the SVVSTM system, it was reported that two groundwater sampling events were conducted at the Site; one in 1996 and one in 1998. These data document reductions in dissolved phase BTEX and LNAPLs in select wells. It should be noted that initial sampling of monitor wells MW-1, MW-2, and MW-3 by WTI in 1992 identified the presence of methyl-ethyl-ketone (MEK) and acetone at levels of up to 590 ppb each. Acetone and MEK were not identified in soil or groundwater samples during this investigation.

2.2 SCOPE OF WORK

FEI/TPA were retained by the Bernalillo County Environmental Health Department (BCEHD) in 1999 to complete Site investigations and implement remedial actions at seven leaking UST sites along Isleta Boulevard including the Old Horn Site.

Our initial scope of work for the Old Horn project consisted of four primary tasks:

- □ Review NMED/USTB files, site mapping, photography, and historic groundwater and soil data.
- □ Assess current Site conditions, sample existing monitor wells and conduct three additional quarters of sampling.
- Advance and sample soil borings, monitor, and pilot test wells in the Site vicinity to identify the magnitude and extent of soil and groundwater hydrocarbon impacts, better evaluate site hydrogeology, and allow for possible later HVE pilot testing.
- □ Analyze collected data and prepare and submit a Hydrogeologic Investigation (HI) Report pursuant to the New Mexico Underground Storage Tank Regulations (USTR) Part XII.

3.0 PHYSICAL SETTING

3.1 PHYSIOGRAPHY

The Site is approximately 1.0 acres in size, and is located at an average elevation of approximately 4,940 feet above mean sea level. Regional topography slopes south-southeast toward the Rio Grande, which is located approximately 2500 feet to the east of the Site (Figure 1).

3.2 GEOLOGIC SETTING

3.2.1 Regional Geology

The Site rests on Quaternary fluvial sediments deposited by the nearby Rio Grande. Underlying the Site are poorly to moderately consolidated sedimentary rocks of the Tertiary Santa Fe Group (Kelly, 1977). During this investigation, only the uppermost Quaternary fluvial unit was encountered.

3.2.2 Site Geology

During the Investigation, a total of 42 boreholes were advanced in the Site vicinity to depths of between 13 and 25 feet bsg at the locations shown in Figure 2. Site geology as observed in retrieved split-spoon samples and soil cuttings can be subdivided into three primary lithologic units based on grain size and areal extent. As with many fluvial depositional settings, lateral and vertical facies changes are common within each of these Lithologic Units and individual subunits tend to pinch out laterally. To better illustrate site geology, TPA constructed the simplified geologic cross section shown in Figure 4 for the location A-A' shown on Figure 2. Borehole lithologic logs are presented in Appendix A.

Lithologic Unit I extends from the ground surface to approximately 5-9 feet bsg and is comprised primarily of lower permeability clayey sands, clayey silty sands, clays, and silts with lesser amounts of silty sands and sand. The upper portions of this Unit have been modified by human activity. Lithologic Unit II extends from the base of Lithologic Unit I to approximately 10-11 feet bsg and is composed primarily of well sorted fine to medium unconsolidated sands with gravelly or coarser grained sand-rich intervals. Lithologic Unit III extends from the base of Lithologic Unit II to below 25 feet bsg and can be divided into two primary subunits. Lithologic Unit IIIa is composed of moderate to poorly-sorted fine to coarse grained sands with gravelly intervals. Lithologic Unit IIIb is composed of a prominent 2- to 4-foot thick fine to medium grained well sorted sand which is often located within Lithologic Unit IIIa at depths ranging between 13 to 19

feet bsg (Figure 4). This subunit is especially prominent beneath the southern and central areas

of the Site.

3.3 HYDROGEOLOGIC SETTING

During the Investigation, unconfined groundwater saturated conditions were encountered in Lithologic Unit III at a depth of approximately 12-13 feet bsg. The unlined Atrisco Lateral ditch is located along the eastern and southern margins of the subject property. This surface hydrologic feature appears to affect shallow groundwater flow locally and to have restricted soil and groundwater contaminant migration at the Site (Figures 7, 8, 9, and 10). Based on groundwater sampling efforts at the Site, the thickness of Lithologic Unit III, and observed grain size, the shallow aquifer is of high yield and permeability. Groundwater level measurements in Site vicinity monitor wells (both existing and new wells) are summarized in Table 1. Evaluation of groundwater level measurements indicated the potentiometric surface sloped to the southwest and south at a gradient of between approximately 0.004 and 0.002 feet/foot on September 21, 2001 (Figure 6). Previous groundwater measurements during the early to mid-1990's suggested groundwater flowed generally towards the south and south-southeast. Similar changes in groundwater flow direction over time were also measured at nearby UST Sites (FEI/TPA, 2001). It is likely that groundwater gradient changes over time are responsible for the western migration of soil and groundwater contaminants in the southern portion of the Site.

4.0 FIELD AND LABORATORY SAMPLING METHODS AND PROCEDURES

4.1 GENERAL

This section describes the methods and procedures for the following project activities:

- □ Soil Boring, Monitor Well, and Pilot Test Well Installation
- Subsurface Soil Sampling and Analysis
- Groundwater Sampling and Analysis

As per the requirements of CFR 1910.120, FEI/TPA prepared a site specific Health and Safety Plan prior to initiation of field activities at the Site. A copy of the Health and Safety Plan is presented in Appendix B.

4.2 SOIL BORING AND MONITOR WELL INSTALLATION

Forty-two boreholes were advanced in the Site vicinity between October 12, 2001 and February 6, 2001 using a CME-75 hollow-stem auger (HSA) drill rig supplied and operated by Rodgers Drilling, Inc. or a short-masted HSA rig operated by Nevex Drilling, Inc. Following advancement, all soil borings not completed as monitor wells were abandoned by backfilling with bentonite-cement grout and native fill or concrete at the land surface. Borehole lithologic logs and monitor well completion diagrams are located in Appendix A.

Nine of the above boreholes were completed as 2-inch diameter monitor wells, two as 4-inch diameter monitor/vacuum extraction (VE) wells, six as multiple completion pilot test wells, one as a 2-inch diameter air injection/deep completion well, and one as a subsurface groundwater flow sensor. The remaining 23 boreholes were plugged and abandoned with bentonite, bentonite-cement grout and native material to the land surface.

The 2-inch diameter PVC monitor wells were set with 10 feet of schedule 40, 0.01 slot standard high-flow screen. A No. 8-12 or a 10-20 silica sandpack was emplaced from the base of the borehole to approximately one to two feet above the top of the well screen followed by approximately 2 feet of bentonite pellets hydrated to form a seal. A bentonite-cement grout was emplaced from the top of the seal to just below the land surface followed by a standard 8-inch or 12-inch manway and concrete apron. A lockable J-type well plug was installed over the top of each PVC well casing. The 4-inch diameter PVC vacuum extraction/monitor wells were set the same as the 2-inch wells with the exception that screen intervals are completed with 10 feet of

schedule 40, 0.01 slot very high-flow wire-wrapped screen.

Each multiple completion pilot test well was constructed with either two or three separate well screens, (one deep, one intermediate, and one shallow) consisting of 2.5 to 3-foot long, 1-inch diameter, schedule 80, standard 0.01 slot screen and associated PVC blank. A No. 8-12 or 10-20 silica sandpack was emplaced across each of the screened intervals. Approximately 1 to 2 feet of hydrated bentonite pellets were placed between each screen interval to create an intermediate seal. The remainder of the borehole was completed with concrete followed by a standard 12-inch manway and concrete apron. 1-inch PVC slip caps were installed over the top of each well casing completing the installation.

One of the boreholes was completed as a 2-inch diameter PVC air injection/deep completion well. The injection/deep completion well consists of a 5-foot long, 2-inch diameter, schedule 40, 0.01 high-flow screen set from approximately 20 to 25 feet bsg. Natural formation sands were allowed to fill in to approximately 1.5 feet above the well screen followed by several inches of 20-40 sand. A bentonite gel slurry was then tremmied to approximately 9 feet bsg followed by a bentonite-cement grout to just below the land surface where a 12-inch manway was set in a concrete apron. A 2-inch diameter J-type compression plug with lock was inserted in the well casing completing the installation.

The groundwater flow sensor provided by Hydrotechnics, Inc. was set in similar fashion as the AS well, with the sensor set from approximately 18 to 20 feet bsg. As per Hydrotechnics personnel instructions, native sediments were allowed to infill the borehole to a depth of approximately 14 feet bsg. A bentonite pellet seal and bentonite-cement grout were emplaced in the remainder of the annular space followed by a second shallow bentonite pellet seal and a 12-inch manway with a concrete apron.

Remaining boreholes not completed as monitor wells were abandoned with bentonite cement grout and native fill to the land surface.

Sediment samples were collected from each borehole and logged on a continuous basis using three-inch diameter, 5-foot long split-spoon core barrels or 2-foot long drive split spoons. Poor sample recovery with the larger spoons required changing to the smaller drive split spoons to increase sample recovery. Samplers were decontaminated between sample runs using an Alconox solution followed by a tap water wash. All soil samples were described by a TPA Geologist or Engineer using the Unified Soil Classification System (USCS) logging methodology. Drill cuttings and rig activity were also observed to identify lithologic contacts. Drill cuttings have been temporarily stored on-site on visquene plastic awaiting proper disposal.

4.3 SOIL SAMPLING AND ANALYSIS

During drilling activities, retrieved sediment samples were collected from boreholes for field headspace analysis using a PID or a flame ionization detector (FID). Total ionizable volatile compounds (TIVC) were measured using a RAE-2000 Model PID utilizing a 10.6 eV lamp. Total volatile organic compounds (TVOC) were measured in select borehole locations with a Sensidyne FID. 100 parts per million/volume (ppm/v) isobutylene span gas and ambient air were used to calibrate the PID prior to use. 250 parts per million/volume (ppm/v) methane span gas and ambient air were used to calibrate the FID prior to use.

Results of the field headspace and laboratory soil analyses are presented in Table 2 and Figures 5 and 7, and on the borehole logs presented in Appendix A. At each drilling location, discrete sediment samples were also collected using the USTR Methanol Extraction Method. These samples were kept on ice and hand delivered to Pinnacle Laboratories, Inc. (Pinnacle) located in Albuquerque, New Mexico for laboratory analyses. Laboratory soil samples were analyzed for the following parameters:

- \Box Total Petroleum Hydrocarbons (C₆-C₃₆ carbon range) (TPH _{gasoline-diesel range}) using EPA Method 8015 (modified) (GC-FID)
- □ Volatile Organic Compounds (VOCs) including BTEX, EDC, EDB, and MTBE using EPA Method 8260 (GC-MS)
- □ Lead using EPA Method 6010/6020 (TCLP) [Select samples]

During the investigation, all soil samples were handled using strict Chain-of-Custody procedures. Laboratory reports including quality assurance/quality control data (QA/QC) and chain-of-custody documentation are presented in Appendix D.

4.4 GROUNDWATER SAMPLING AND ANALYSIS

Two separate groundwater sampling events were conducted in the Site Vicinity as part of the HI. On September 21, 2000, during the 1st quarter sampling event, groundwater samples were collected from seven of the previously installed monitor wells by FEI for laboratory analysis. On March 23, 2001, following completion of HI drilling, FEI/TPA staff collected groundwater samples from the 12 newly installed monitor/VE/AI wells. Groundwater laboratory analytical results are presented in Table 3, Figure 10, and Appendix D.

During each of the two sampling events, the water level in each well was measured and also gauged for the presence of LNAPL. Temperature, pH and conductivity measurements were taken during well purging to document well stabilization. In order to purge and develop the

monitor wells, between three to five well volumes were removed prior to collection of groundwater samples using a downhole submersible pump. The pump was decontaminated between wells with a Alconox solution followed by a distilled water rinse. Groundwater samples were collected and stored in appropriate containers using the appropriate preservatives. A blind duplicate was collected from one of the monitor wells for QA/QC purposes during one of the sampling events. In addition, an equipment rinsate blank was collected during the first sampling event. It should be noted that trace levels of benzene, ethyl benzene, total xylenes, tri-methyl benzenes, and naphthalene were identified in the equipment blank sample. Steps will be taken by FEI//TPA during the next sampling event to prevent this occurrence in the future. Samples were collected using strict chain-of-custody procedures, stored on ice in a cooler, and hand-delivered to Pinnacle. Purge water was discharged to an on-site paved surface to allow volatilization of any VOCs as per NMED guidance documentation.

Groundwater samples were analyzed for the following parameters:

- □ Volatile Organic Compounds (VOCs) including BTEX, EDC, EDB, tri-methyl benzenes (TMBs), naphthalene, and MTBE using EPA Method 8260 (GC-MS)
- □ Electron receptors (Sulfide, NO₃, Carbonates, and Fe₂) using CHEMets Colorimetric Test Kits

5.0 RESULTS OF THE INVESTIGATION

5.1 HYDROCARBON DISTRIBUTION IN SOIL

Table 2 presents a summary of laboratory analytical results for soil samples collected during subsurface drilling operations at the Site. In addition, the magnitude and extent of soil TIVC and TPH in cross-sectional view and plan view are presented in Figures 5, 7, 8, and 9. Based on drilling data, soil hydrocarbons in the Site vicinity exceeding TPH and/or TIVC levels extend across a very large area.

The TIVC/TVOC soil headspace plume exceeding 100 ppm/v is approximately 280 by 320 feet across, encompassing an area of approximately 60,000 ft². In the central and southern portions of the Site, almost the entire vadose zone exceeds 100 ppm/v (Figure 5). The adsorbed-phase TPH soil contamination exceeding 100 ppm is almost as extensive as the headspace plume measuring approximately 270 by 300 feet in size. In general, soil TPH is restricted to Lithologic Units II and III except in the southern portions of the Site where Lithologic Unit I is also impacted.

Spatial analysis of the horizontal and vertical extent of both TIVC/TVOC headspace concentrations and TPH concentrations suggest two primary release areas. Hydrocarbon releases from the former UST storage and delivery systems in the southern portion of the Site combined with probable surface spills appear to have impacted soils and groundwater primarily in the release area and west of the Site. A second smaller release area appears to have been located in the northern portion of the Site in the vicinity of boreholes B-6 and B-12 (Figure 8). Based on the distribution of the northern hydrocarbons, it is likely that surface and possibly subsurface spills occurred. The primary release areas have co-mingled over time.

Analysis of laboratory TPH chromatograms indicate the majority of hydrocarbons in soils at the Site are in the C_8 to C_{14} carbon ranges, which correlate with highly weathered gasoline or kerosene fuels. Locally, soil samples contain hydrocarbons extending up into the C_{22} to C_{26} carbon ranges, which correlate with diesel fuel and motor oil. Based on a limited knowledge of past site use, we believe that the primary hydrocarbon fuel in the subsurface is highly weathered gasoline. Most sample locations show moderate to heavy weathering of BTEX compounds. Maximum combined BTEX concentrations were identified at 257 ppm in samples collected from borehole B-1 at 13'-15' depth. Maximum TPH_{gasoline range} and TPH_{kerosene+ range} concentrations were identified in the same location at levels of 17,000 and 5,400 ppm, respectively.

Combined TPH levels in retrieved soil samples exceeding 1,000 ppm were found in 17 of the 42 boreholes advanced at the Site (Figure 9). Combined TIVC/TVOC levels in retrieved soil samples exceeding 1000 ppm/v were found in 28 of the 42 boreholes advanced at the Site (Figure 7). TPH levels exceeding 100 ppm extend across an area approximately 270 feet by 300 feet across. TIVC levels exceeding 100 ppm/v extend across a slightly larger area approximately 280 feet by 320 feet in size. Hydrocarbon saturated or "highly contaminated" soils were identified in many of the boreholes advanced in the southern portion of the Site during this investigation (see Borehole logs, Appendix A).

5.2 HYDROCARBON DISTRIBUTION IN GROUNDWATER

Groundwater sampling data and chromatographic analysis suggest that natural biodegradation have successfully removed portions of the lighter end BTEX components from the Site. Based on the last two sampling events, six wells (VM-1, VM-2, FTW-1, MW-10, MW-1B, and MW-3A) had one or more of the following constituents above NMWQCC and NMED/USTB standards; benzene, ethyl benzene, total xylenes, and/or naphthalene. Table 3 and Figure 10 present a summary of detailed information on the distribution of hydrocarbon contaminants and groundwater quality at the Site.

Maximum benzene, ethyl benzene, total xylenes, and naphthalene groundwater concentrations were measured in samples collected from monitor well VM-1 at 970, 2300, 930, and 700 ppb, respectively. Maximum toluene concentrations were measured in monitor well VM-2 at 8.7 ppb. EDB, EDC, and MTBE were not identified in groundwater samples at concentrations exceeding laboratory method detection limits (MDLs). BTEX concentrations appear to have decreased over the 10-year period of sporadic groundwater monitoring at the Site. Accumulations of LNAPLs were not observed in monitor wells in the Site vicinity during the September 2000 and March 2001 sampling events. Prior sampling events identified LNAPLs in monitor well MW-10 and MW-1B. Unlike the early WTI investigation, MEK and acetone were not identified in any groundwater samples at concentrations exceeding MDLs.

Inorganic water quality analyses of groundwater samples collected from pre-existing and newly installed wells are presented in Table 3. Bicarbonate is the primary inorganic groundwater constituent identified at the Site with concentrations ranging between 150 to 550 ppm. Phosphate, iron, and nitrate concentrations were identified at low levels. Sulfate concentrations were not tested for. Groundwater pH levels were measured between 6.47 to 7.81.

5.3 RESIDUAL SPILL MASS ESTIMATES

An estimated 11,000 cubic yards of hydrocarbon contaminated soil (including vapor-phase hydrocarbons) is present with approximately 13,000 cubic yards of non-impacted overburden. Residual TPH spill mass estimates suggest that approximately 40,000 pounds (lbs.)/6,300 gallons of $TPH_{gasoline-diesel}$ is still present in the immediate Site vicinity. Calculations are presented in Appendix C.

6.0 CONCLUSIONS

Based on the data collected during the Hydrogeologic Investigation, the following conclusions are presented:

- □ Site geology as observed in retrieved soil samples can be subdivided into three primary laterally extensive lithologic units (Figure 4) which appear to have been deposited by fluvial processes. Lithologic Unit I is composed primarily of finer grained clayey sands, clays, and silts. Lithologic Unit II is composed primarily of well sorted fine to medium grained sands. Lithologic Unit IIIa is composed of moderately poorly sorted fine- to coarse grained gravelly sands. Lithologic Unit IIIb is composed of well sorted sands set within the larger Lithologic Unit IIIa. Individual facies often pinch out laterally at the Site.
- □ Two primary hydrocarbon release areas have been identified at the Site; one associated with the former southern UST systems; one from an unknown source in the north–central portion of the Site (Figure 8).
- During the Investigation, unconfined groundwater was first encountered at depths of between 12 and 13 feet bsg. Groundwater flow in the shallow aquifer was calculated to be primarily to the southwest and south at a hydraulic gradient between 0.002 and 0.004 feet/foot.
- Hydrocarbon soil contamination consists of an extensive vapor-phase halo extending across an area approximately 280 by 320 feet across which surrounds a slightly smaller TPH adsorbed-phase core (Figures 7, 8, and 9). Soil contaminants are present in all three Lithologic Units. Hydrocarbons were measured in soils at concentrations exceeding 10,000 ppm/v TIVC/TVOC and 22,000 ppm TPH.
- Analysis of laboratory chromatograms and carbon range breakdowns indicate the hydrocarbons identified at the Site are highly weathered gasoline and/or kerosene with lesser amounts of localized diesel and oil. Natural biodegradation and dispersion processes appear to have preferentially removed some of the lighter end TPH compounds (i.e. BTEX) from soils and groundwater at the Site.
- □ Residual TPH spill mass estimates suggest that approximately 40,000 pounds (lbs.)/6,300 gallons of TPH are still present in the immediate Site vicinity. Approximately 11,000 cubic yards of hydrocarbon impacted soils are present at the Site with approximately 15,000 cubic yards of overburden.

7.0 RECOMMENDATIONS

Based on the information collected during this investigation and the requirements of the USTR Part XII, FEI/TPA recommends the following actions at the Site:

- Conduct a Tier Two RBCA evaluation to determine if any additional remedial efforts are necessary at the Site.
- □ Implement of an aggressive comprehensive remedial strategy to mitigate the extensive soil hydrocarbons in the Site vicinity, especially in light of planned excavation activities associated with the right-of-way widening of Isleta Boulevard.
- □ Continue quarterly groundwater monitoring at the Site to document plume attenuation and protect human health and the environment.

Three primary remediation strategies appear to be potentially useful at the Site. These include one or more of the following: 1) excavation and disposal of TPH-impacted soils; 2) in-situ vacuum extraction/air ozone injection; and 3) in-situ chemical oxidation.

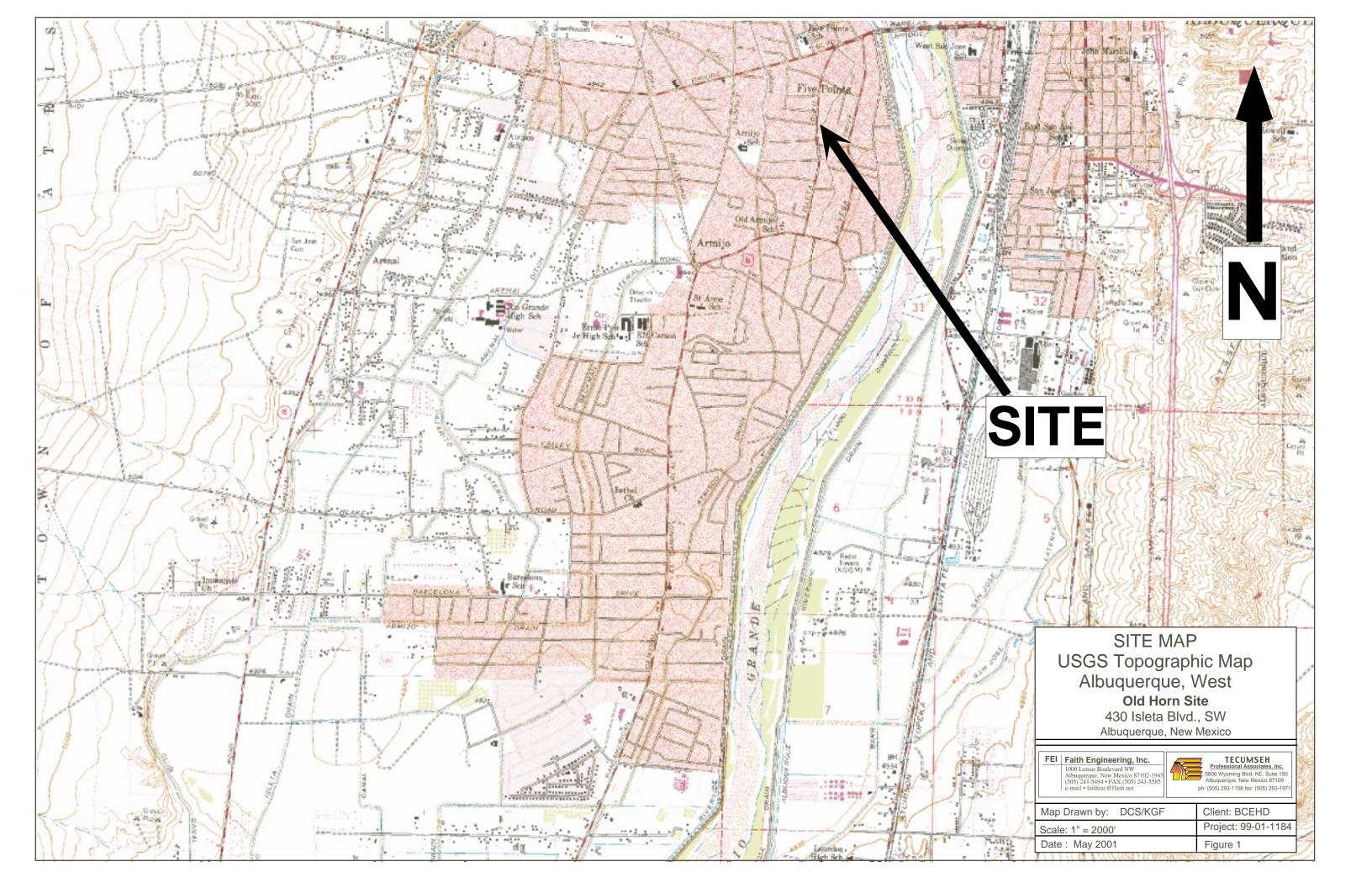
8.0 REFERENCES

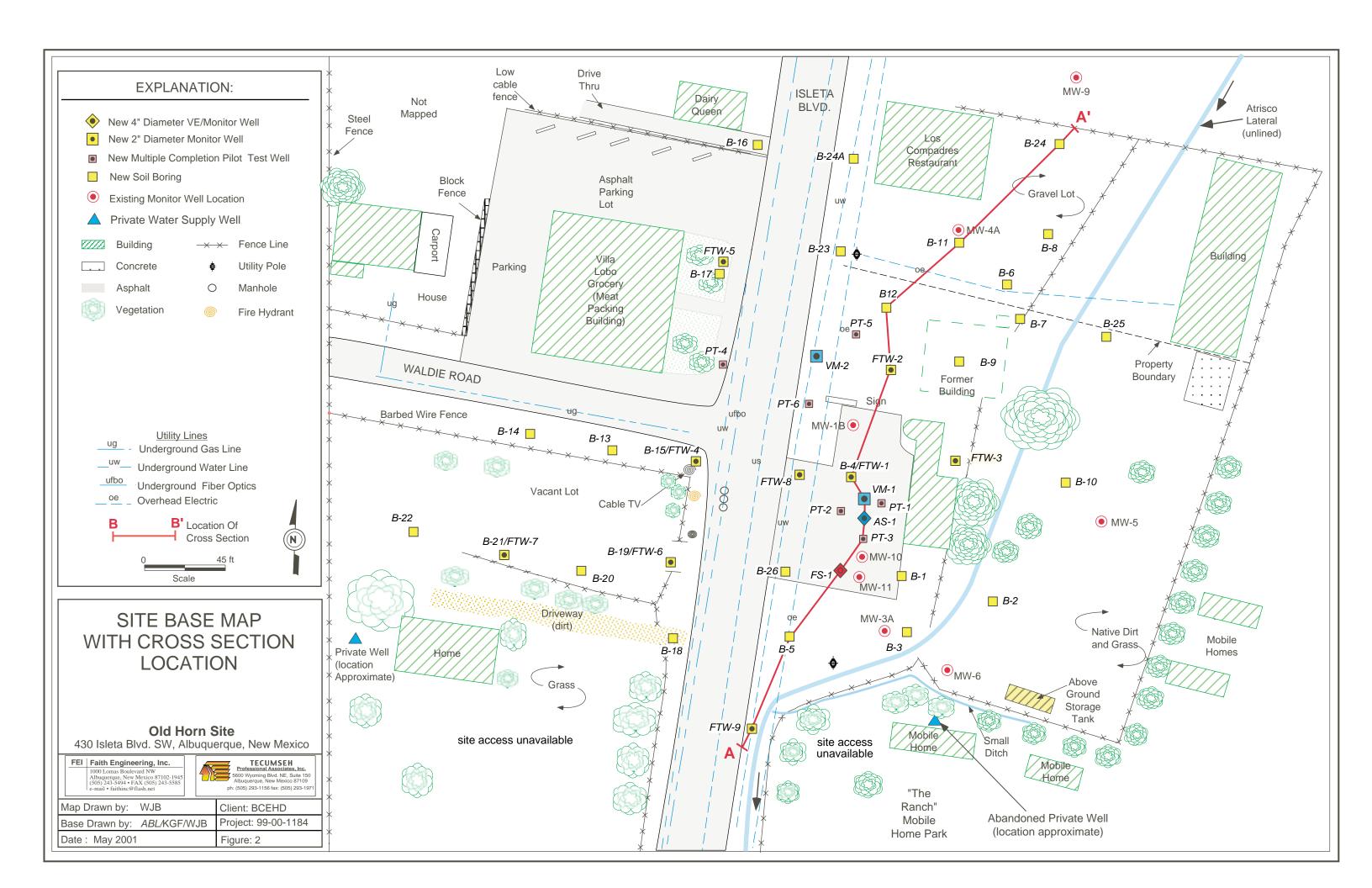
- Intera, Inc., (1995) Reclamation Proposal Old Horn Site, Albuquerque, New Mexico.
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- Western Technologies, Inc. (1991) Site Assessment Former Service Station 430 Isleta Boulevard, SW, Albuquerque, New Mexico.

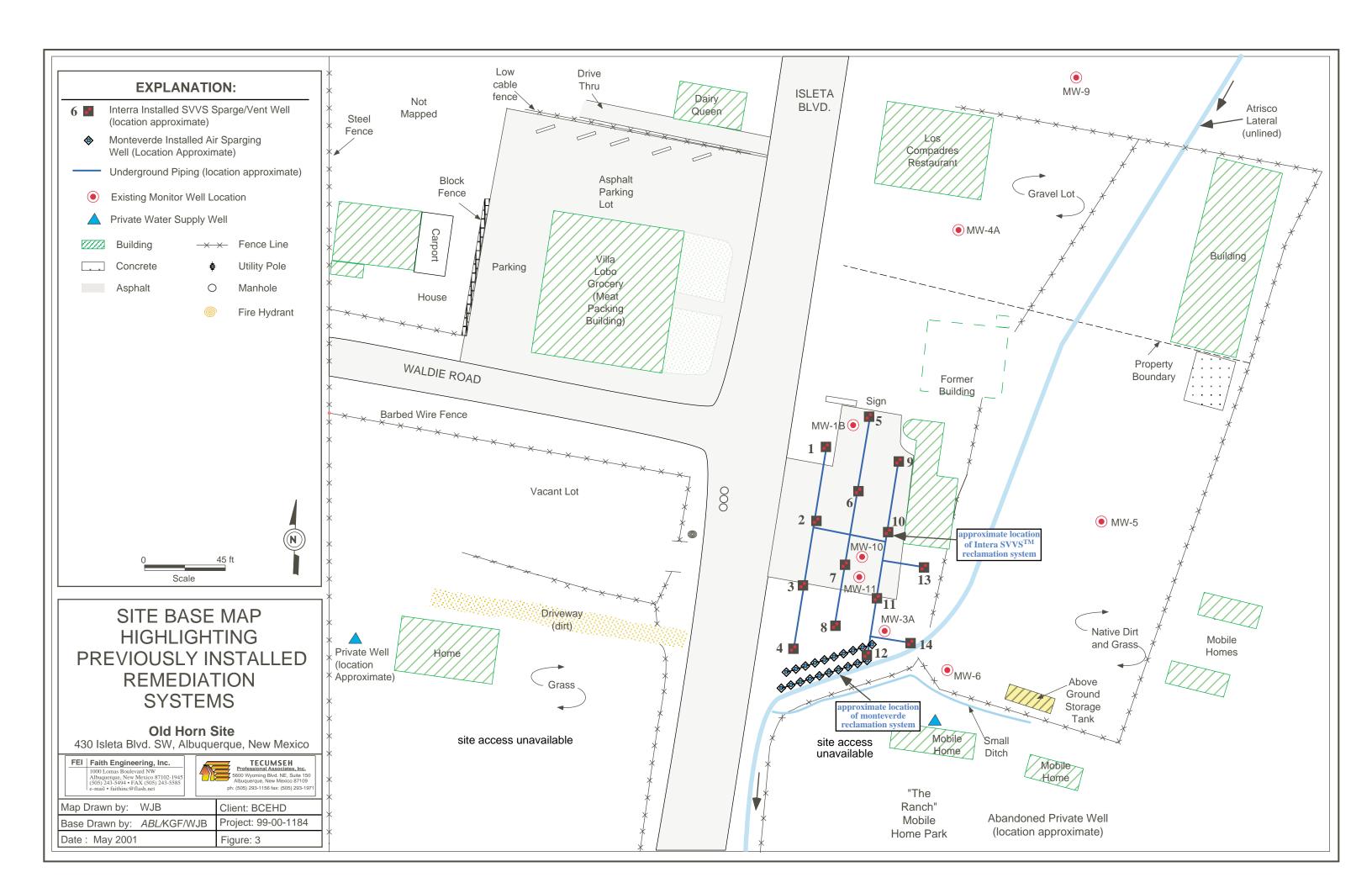
9.0 STATEMENT OF FAMILIARITY

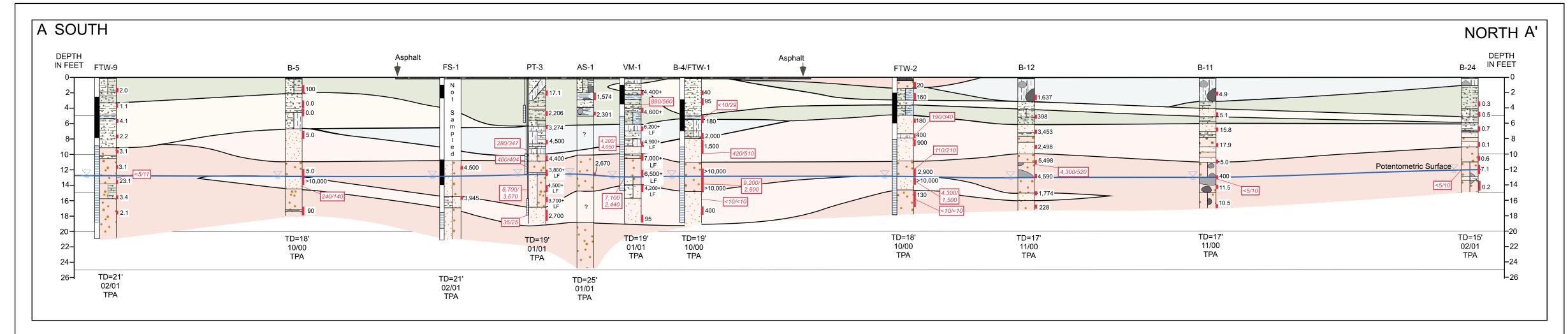
We are personally familiar with the information presented in this report and it is accurate and complete to the best of our knowledge.

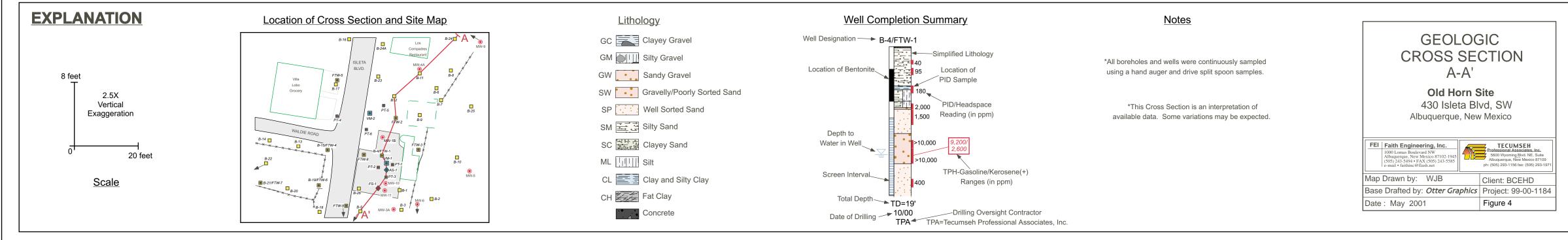
Faith Engineering, Inc.	Tecumseh Professional Associates, Ind		
Stuart E. Faith, P.E.	William J. Brown, PG		
President	Senior Hydrogeologist		

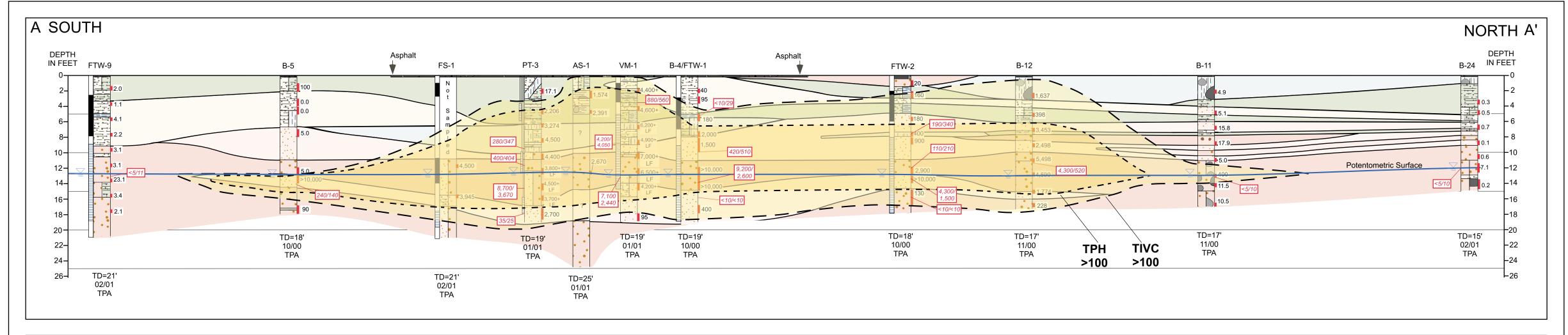


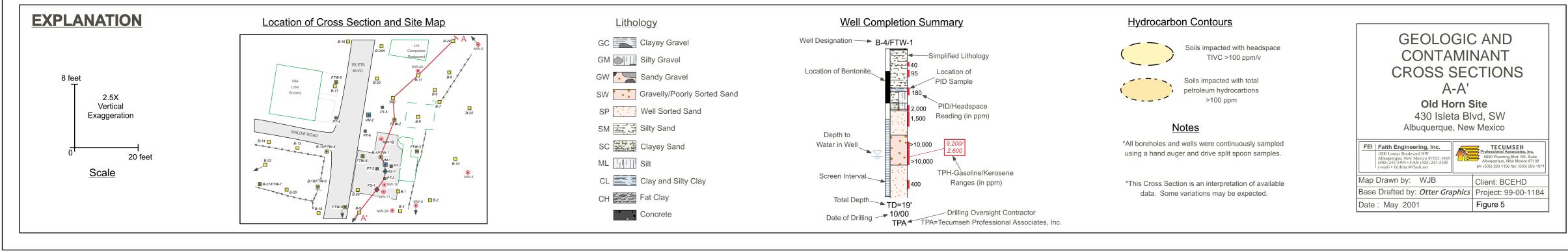


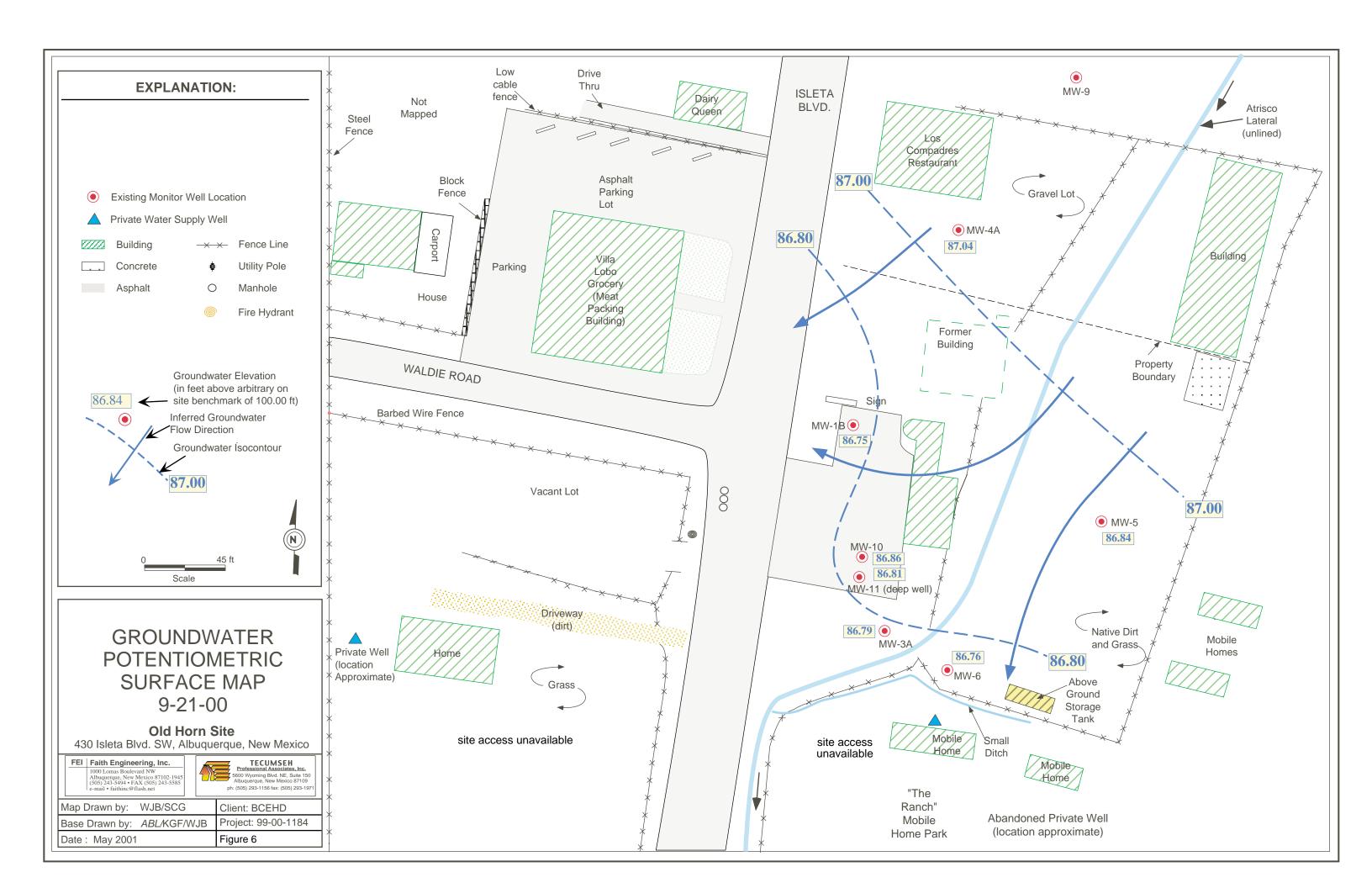


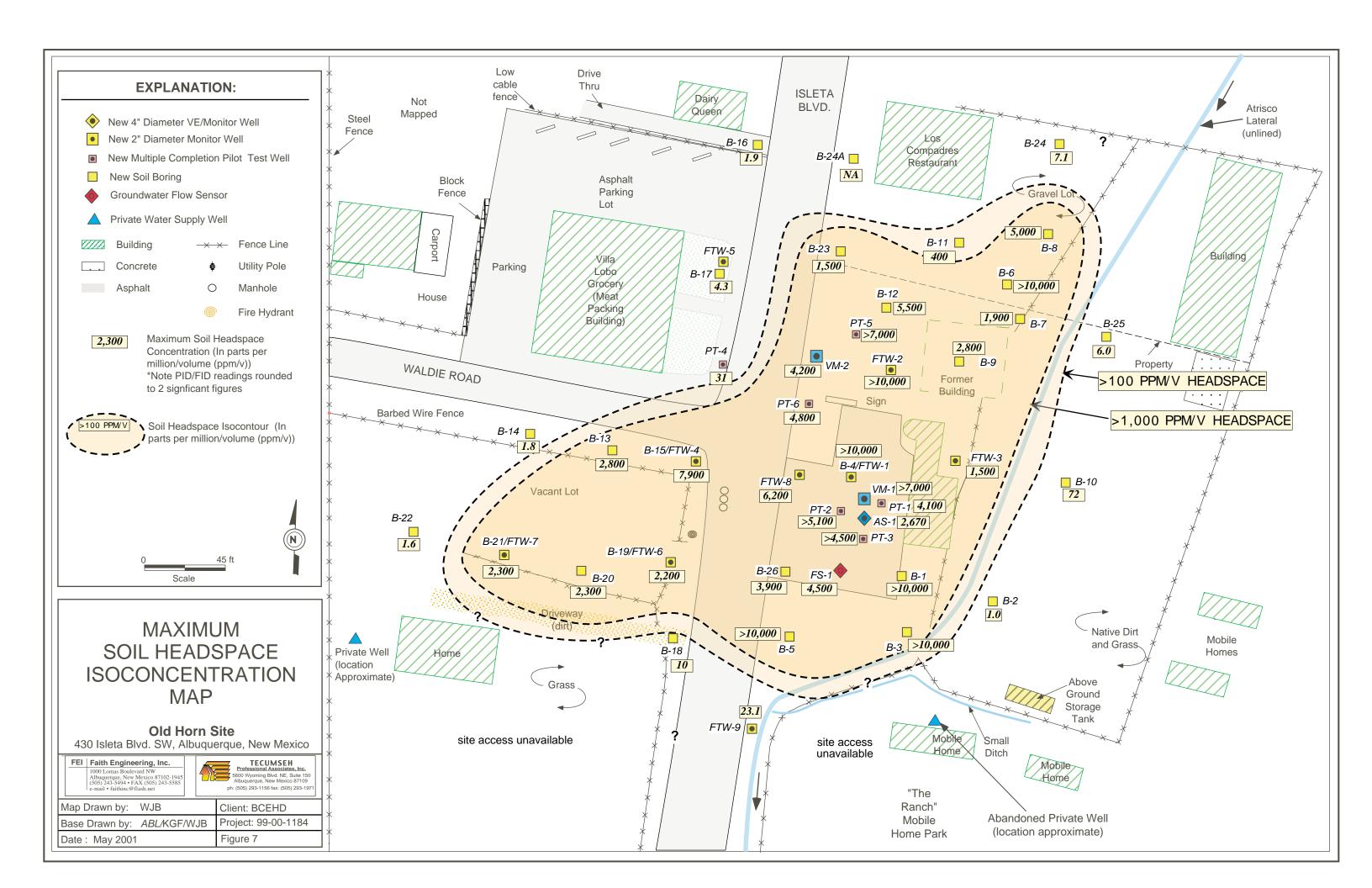


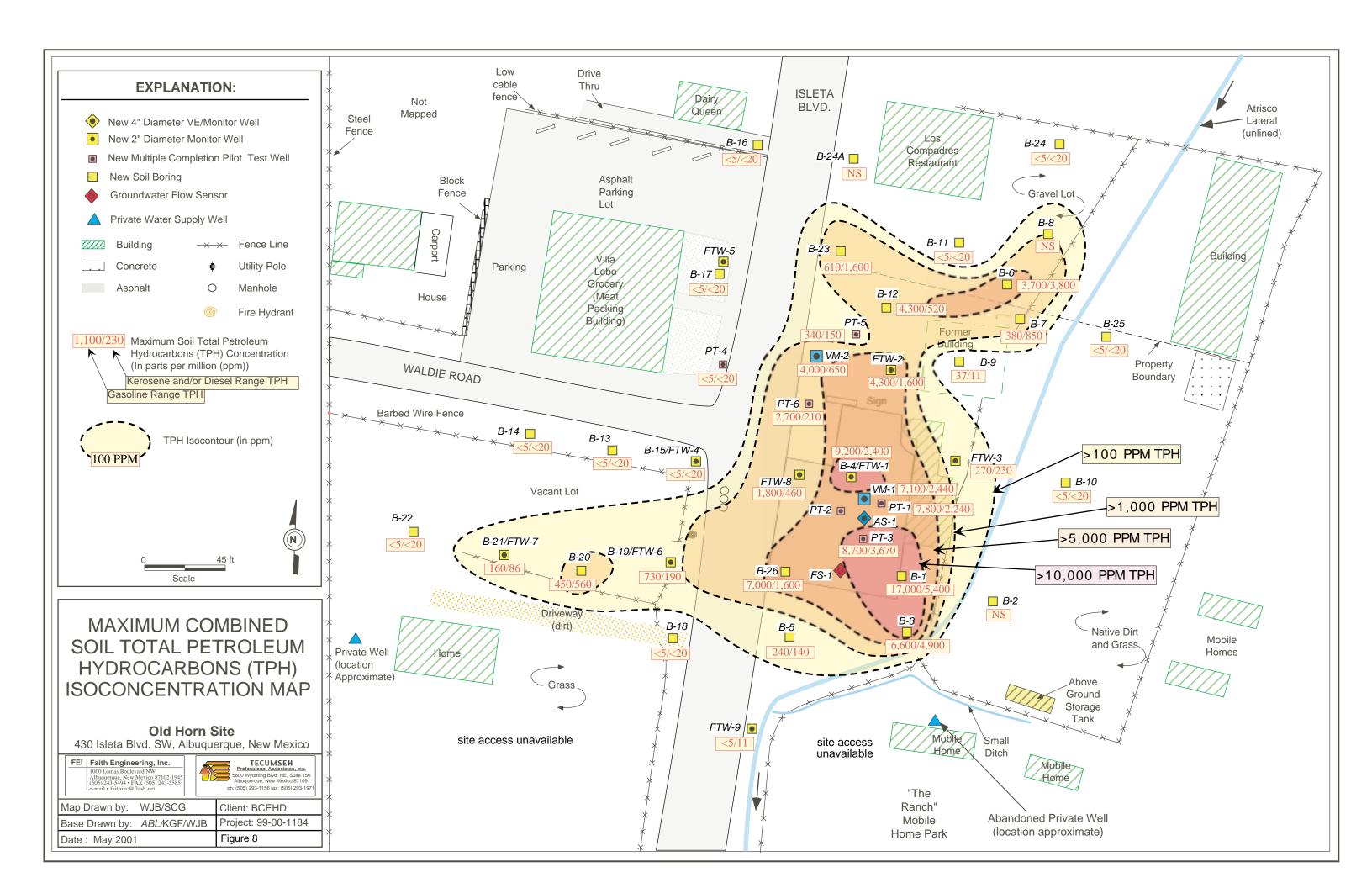


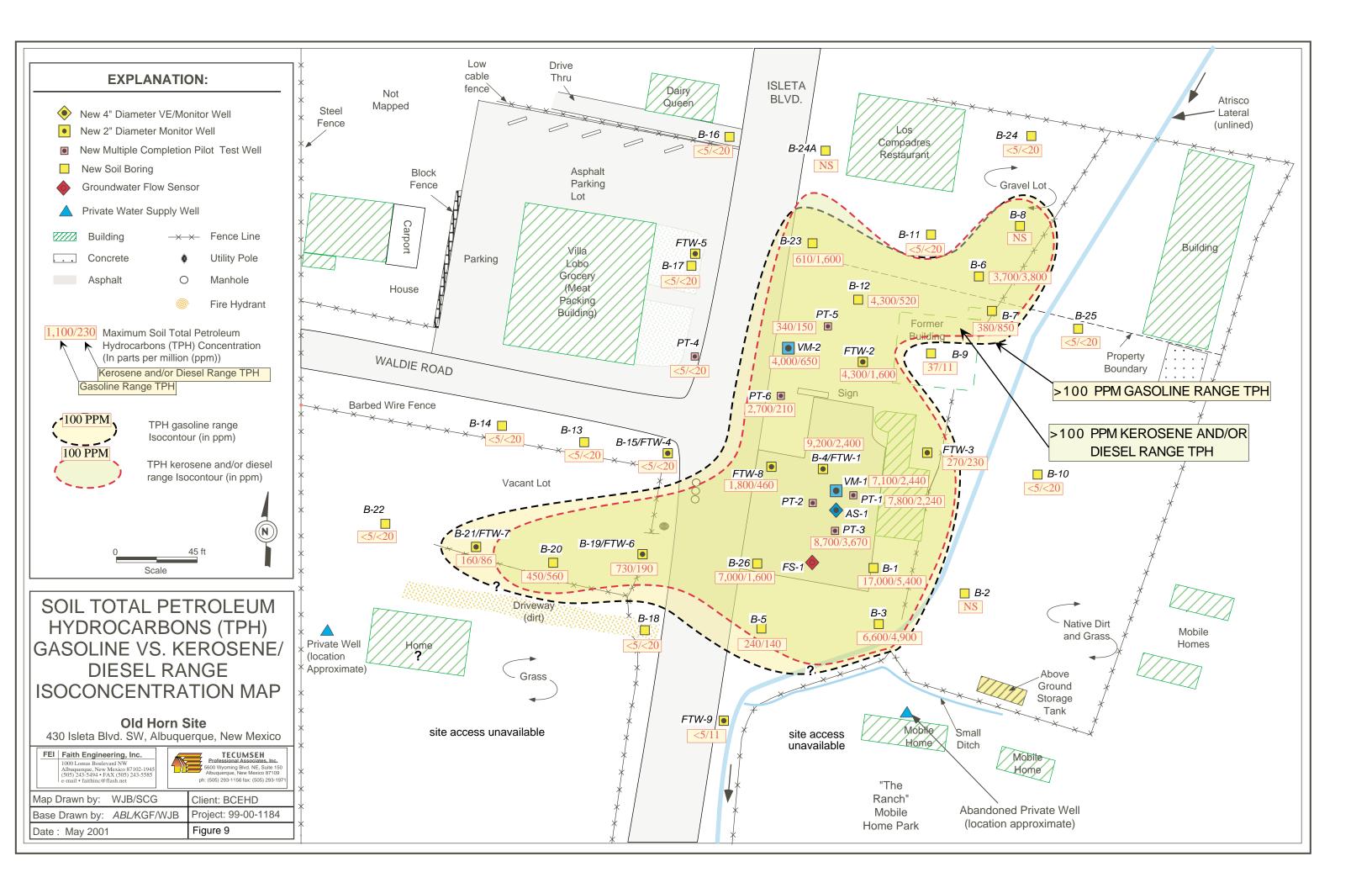












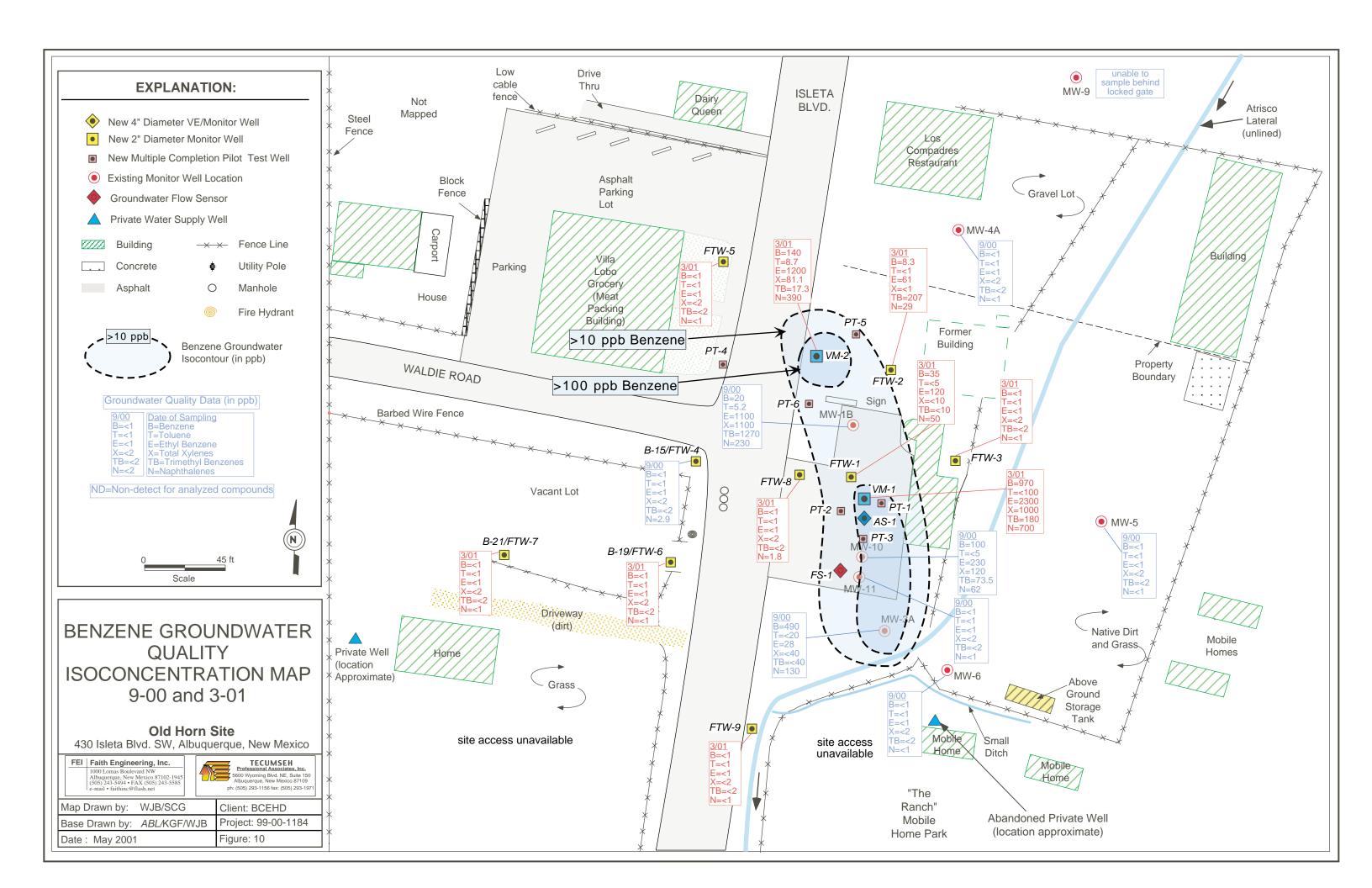


TABLE 1 00-01-1184-03 • Old Horn • 430 Isleta Blvd. SW NMED FACILITY #28600

SUMMARY OF GROUND WATER ELEVATION MEASUREMENTS OF EXISTING WELLS

WELL NUMBER	ELEVATION (feet above datum)	DATE	STATIC (feet BG)	WATER LEVEL (feet AD)	(+) = RISING (-) = FALLING
MW-1B	100.00	9/21/00	13.25	86.75	
		3/23/01	12.66	87.34	0.59
MW-3A	100.89	9/21/00	14.10	86.79	
		3/23/01	13.68	87.21	0.42
MW-4A	99.41	9/21/00	12.37	87.04	
		3/23/01	*		
MW-5	97.02	9/21/00	10.18	86.84	
		3/23/01	9.75	87.27	0.43
MW-6	99.49	9/21/00	12.73	86.76	
		3/23/01	12.30	87.19	0.43
MW-10	100.23	9/21/00	13.37	86.86	
		3/23/01	12.94	87.29	0.43
MW-11	100.15	9/21/00	13.34	86.81	
		3/23/01	12.83	87.32	0.51

*	-	Covered	by	Asphal	t

Data checked	/	1

SUMMARY OF GROUND WATER ELEVATION MEASUREMENTS OF NEW WELLS

WELL NUMBER	ELEVATION (feet above datum)	DATE	STATIC (feet BG)	WATER LEVEL (feet AD)	(+) = RISING (-) = FALLING
FTW-1	†	3/23/01	12.60	*	**
FTW-2	t	3/23/01	12.58	*	**
FTW-3	†	3/23/01	12.18	*	**
FTW-5	†	3/23/01	11.75	*	**
FTW-6	†	3/23/01	11.30	*	**
FTW-7	†	3/23/01	10.38	*	**
FTW-8	†	3/23/01	11.70	*	**
FTW-9	†	3/23/01	12.47	*	**
VM-1	†	3/23/01	12.83	*	**
VM-2	†	3/23/01	12.20	*	**
AS-1	†	3/23/01	12.98	*	**

- † pending survey and drill completion
- * not determined, pending elevation
- ** will be determined with another measurement

Data checked	/	

SOIL BORING ANALYSIS RESULTS 8260/8015

	1		0200/0013											1		
						ORGA	NICS						HYDI	ROCAR	BONS	
LOCATION	DATE SAMPLED	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE	EDB	EDC	ТМВ	NAPHTHALENE	TPH C6-C14 8015 GRO	C6-C10 8015 Mod.	C10-C22 8015 Mod.	C22-C36 8015 Mod.	Total TPH 8015 Mod.
UNITS STANDARDS		mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg <u>50</u>	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg <u>100</u>	mg/Kg	mg/Kg	mg/Kg	mg/Kg <u>100</u>
B-1-11'-13' (SP)	10/12/00	< 0.05	< 0.05	< 0.05	<0.1	< 0.25	< 0.05	< 0.05	< 0.05	<0.1	< 0.05	*	< 10	< 10	18	18
B-1-13'-15' (SW)	10/12/00	3.2	< 0.5	134	120	257.2	< 0.5	< 0.5	< 0.5	294.8	55	*	17000	5400	< 500	22400
B-3-13'-13.5' (SP)	10/12/00	< 0.05	< 0.05	< 0.05	<0.1	< 0.25	< 0.05	< 0.05	< 0.05	<0.1	< 0.05	*	< 10	< 10	< 10	*
B-3-13.5'-14' (SP)	10/12/00	4.6	< 1.0	38	43	85.6	< 1.0	< 1.0	< 1.0	101.8	25	*	6600	4900	< 200	11500
B-4-5'-6' (SC/CL)	10/12/00	< 0.05	< 0.05	6.9	2.5	9.4	< 0.05	< 0.05	< 0.05	8.2	4.1	*	< 10	16	13	29
B-4-9'-11' (SP)	10/12/00	< 0.05	< 0.05	6.6	2.4	9.0	< 0.05	< 0.05	< 0.05	8.2	4.2	*	420	510	< 10	930
B-4-13'-15' (SW)	10/12/00	1.2	< 1.0	110	38	149.2	< 1.0	< 1.0	< 1.0	20.6	35	*	9200	2600	< 200	11800
B-4-15'-17' (SP)	10/12/00	< 0.05	< 0.05	0.31	0.16	0.47	< 0.05	< 0.05	< 0.05	<0.1	0.24	*	< 10	< 10	< 10	*
B-5-13'-14' (SP)	10/13/00	< 0.5	< 0.5	38	10	48	< 0.5	< 0.5	< 0.5	18.8	14	*	240	140	< 10	380
B-6-12'-13' (SP/SW)	10/13/00	< 0.25	< 0.25	< 0.25	< 0.5	< 1.25	< 0.25	< 0.25	< 0.25	31.1	< 0.25	*	3700	3800	< 100	7500
B-7-13'-14' (SW/SP)	10/13/00	< 0.05	< 0.05	< 0.05	< 0.1	< 0.25	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	*	380	850	< 10	1230
B-9-13-13.5 (SW)	11/28/00	< 0.05	< 0.05	< 0.05	< 0.10	< 0.25	< 0.05	< 0.05	< 0.05	0.53	< 0.05	37	11	< 10	< 10	11
B-10-13-13.5 (SW)	11/28/00	< 0.05	< 0.05	< 0.05	< 0.10	< 0.25	< 0.05	< 0.05	< 0.05	< 0.10	< 0.05	< 5.0	< 10	< 10	< 10	*
B-11-13-13.2 (GW)	11/28/00	< 0.05	< 0.05	< 0.05	< 0.10	< 0.25	< 0.05	< 0.05	< 0.05	< 0.10	< 0.05	< 5.0	< 10	< 10	< 10	*
B-12-11-11.5 (SW)	11/28/00	< 1.0	< 1.0	29	44	73	< 1.0	< 1.0	< 1.0	73	5.2	4300	1100	520	< 10	1620

SOIL BORING ANALYSIS RESULTS 8260/8015

						ORGA							HYDI	ROCAR	BONS	
LOCATION	DATE SAMPLED	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE	EDB	EDC	TMB	NAPHTHALENE	TPH C6-C14 8015 GRO	C6-C10 8015 Mod.	C10-C22 8015 Mod.	C22-C36 8015 Mod.	Total TPH 8015 Mod.
UNITS STANDARDS		mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg <u>50</u>	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg <u>100</u>	mg/Kg	mg/Kg	mg/Kg	mg/Kg <u>100</u>
B-13, 13.5-14 (SW)	1/29/01	< 0.05	< 0.05	< 0.05	< 0.1	< 2.5	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 5.0	13	22	< 10	35
B-14, 13.5-14 (SW)	1/29/01	< 0.05	< 0.05	< 0.05	< 0.1	< 2.5	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 5.0	< 10	< 10	< 10	*
B-15, 12-12.5 (SW)	1/30/01	< 0.25	< 0.25	< 0.25	< 0.5	< 1.25	< 0.25	< 0.25	< 0.25	< 0.5	< 0.25	2900	2800	1800	< 100	4600
B-16, 13.5-14 (SW)	1/30/01	< 0.05	< 0.05	< 0.05	< 0.1	< 2.5	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 5.0	< 10	< 10	< 10	*
B-17, 13-13.5 (SW)	1/30/01	< 0.05	< 0.05	< 0.05	< 0.1	< 2.5	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 5.0	< 10	< 10	< 10	*
B-18, 12.5-13 (SW)	1/31/01	< 0.05	< 0.05	< 0.05	< 0.1	< 2.5	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 5.0	< 10	< 10	< 10	*
B-19-12' (SP)	1/31/01	< 0.10	< 0.10	< 0.10	< 0.20	< 0.50	< 0.10	< 0.10	< 0.10	< 0.20	< 0.10	730	120	170	20	310
B-19-15'-17' (SP)	1/31/01	< 0.05	< 0.05	< 0.05	< 0.10	< 0.25	< 0.05	< 0.05	< 0.05	< 0.10	< 0.05	< 5.0	< 10	< 10	< 10	< 30
B-20-12'-13' (SP/GP)	1/31/01	< 0.05	< 0.05	< 0.05	< 0.10	< 0.25	< 0.05	< 0.05	< 0.05	< 0.10	< 0.05	270	450	550	< 10	1000
B-21-11'-12' (SW)	1/31/01	< 0.05	< 0.05	< 0.05	< 0.10	< 0.25	< 0.05	< 0.05	< 0.05	< 0.10	0.11	160	14	76	< 10	90
B-22-11'-13' (SW)	1/31/01	< 0.05	< 0.05	< 0.05	< 0.10	< 0.25	< 0.05	< 0.05	< 0.05	< 0.10	<0.05	< 5.0	< 10	< 10	< 10	< 30
B-23, 11.5-12 (SM)	2/1/01	< 0.05	< 0.05	< 0.05	< 0.1	< 2.5	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	160	610	1600	< 10	2210
B-24, 11-13 (SW/GW)	2/2/01	< 0.05	< 0.05	< 0.05	< 0.1	< 2.5	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 5.0	< 10	< 10	< 10	*
B-25, 11-13 (GM)	2/2/01	< 0.05	< 0.05	< 0.05	< 0.1	< 2.5	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 5.0	< 10	< 10	< 10	*
B-26, 12.5-13 (SW)	2/6/01	2.7	< 1.0	110	28	140.7	< 1.00	< 1.00	< 1.00	14.1	23	7000	3500	1500	< 100	5000
FTW-2-7.5'-8.0' (ML)	10/12/00	< 0.05	< 0.05	2.9	6.1	9.0	< 0.05	< 0.05	< 0.05	10.8	1.5	*	190	340	< 10	530
FTW-2-12'-12.5' (SW)	10/12/00	< 0.05	< 0.05	1.4	4.8	6.2	< 0.05	< 0.05	< 0.05	9.0	1.3	*	110	210	< 10	320
FTW-2-13'-14- (SP)	10/12/00	< 0.25	< 0.25	42	92	134	< 0.25	< 0.25	< 0.25	139	14	*	4300	1500	< 100	5800
FTW-2-15'-17' (SW)	10/12/00	< 0.05	< 0.05	< 0.05	<0.1	< 0.25	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	*	< 10	< 10	< 10	*

SOIL BORING ANALYSIS RESULTS 8260/8015

						ORGA	NICS					HYDROCARBONS					
LOCATION	DATE SAMPLED	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE	EDB	EDC	TMB	NAPHTHALENE	TPH C6-C14 8015 GRO	C6-C10 8015 Mod.	C10-C22 8015 Mod.	C22-C36 8015 Mod.	Total TPH 8015 Mod.	
UNITS STANDARDS		mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg <u>50</u>	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg <u>100</u>	mg/Kg	mg/Kg	mg/Kg	mg/Kg <u>100</u>	
FTW-3-14'-15' (SW)	10/13/00	< 0.05	< 0.05	< 0.05	< 0.1	< 0.25	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	*	270	230	< 100	500	
FTW-8, 12.5-13, (SW)	2/5/01	0.42	0.16	5.4	1.7	7.68	< 0.10	< 0.10	< 0.10	0.1	5.6	1800	840	450	< 10	1290	
FTW-9, 13-13.5, (SW)	2/5/01	< 0.05	< 0.05	< 0.05	< 0.1	< 2.5	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 5.0	< 10	11	< 10	11	
VM-1-3-3.5 (SC)	11/28/00	0.64	< 0.5	13	1.7	15.34	< 0.50	< 0.50	< 0.50	< 1.04	2.9	880	200	400	160	760	
VM-1-8-9 (SM/ML)	11/28/00	2.0	< 1.0	77	73.2	152.2	< 1.0	< 1.0	< 1.0	93	20	4200	5700	3600	450	9750	
VM-1-13-13.5 (SW)	11/28/00	3.5	< 2.5	100	51	154.5	< 2.5	< 2.5	< 2.5	40	33	7100	7100	2300	140	9540	
VM-2, 12.5-13, (SW)	2/21/01	<0.25	<0.25	19.0	0.93	19.93	<0.25	<0.25	<0.25	< 0.5	7.0	4000	1200	630	20	1850	
PT-1-7.5'-8' (ML)	1/29/01	0.08	< 0.05	4.7	3.03	7.81	< 0.05	< 0.05	< 0.05	6.66	1.7	380	330	350	41	721	
PT-1-12.5' (SW)	1/29/01	3.2	< 1.0	46	46	95.2	< 1.0	< 1.0	< 1.0	193	35	7800	4500	2100	140	6740	
PT-2-6.5'-7' (SC/CL)	1/29/01	0.08	< 0.05	1.1	1.29	2.47	< 0.05	< 0.05	< 0.05	1.78	0.51	74	36	54	< 10	90	
PT-3-9.5' (ML)	1/29/01	0.07	< 0.05	1.1	1.1	2.27	< 0.05	< 0.05	< 0.05	2.63	0.55	280	110	320	27	457	
PT-3-12.5'-13' (SW)	1/29/01	< 0.1	< 0.1	1.7	1.0	2.7	< 0.1	< 0.1	< 0.1	0.92	0.83	400	180	370	34	584	
PT-3-14.5'-15' (SW/GW)	1/29/01	7.2	< 1.0	150	58	215.2	< 1.0	< 1.0	< 1.0	38.8	28	8700	8600	3500	170	12270	
PT-3-17'-19' (SP)	1/29/01	< 0.05	< 0.05	0.45	0.11	0.56	< 0.05	< 0.05	< 0.05	< 0.1	0.18	35	39	25	< 10	64	
PT-4, 13-14 (SW)	1/31/01	< 0.05	< 0.05	< 0.05	< 0.1	< 2.5	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 5.0	< 10	< 10	< 10	*	
PT-5, 13.5-14, (SW)	2/2/01	< 0.05	< 0.05	2.4	1.18	3.58	< 0.05	< 0.05	< 0.05	2.79	0.25	250	340	150	< 10	490	
PT-6, 12-13, (SW)	2/6/01	< 0.50	< 0.50	25	0.97	25.97	< 0.50	< 0.50	< 0.50	< 1.0	5.7	2700	390	210	< 10	600	

BOLD - Above NMED Standards

Data checked _____ / _____

^{* -} Sum not calculated for non-detects

SOIL BORING ANALYSIS RESULTS TCLP LEAD

LOCATION	DATE SAMPLED	LEAD						
UNITS	UNITS							
STANDARD	s	<u>5.0</u>						
PT-3-12.5'-13' (SW)	1/29/01	0.0129						
B-21-11'-12' (SW)	1/31/01	0.0042						
VM-1-13'-13.5' (SW)	11/28/00	Not Detected						

Data	Checked	/	

TABLE 3 Old Horn • 430 Isleta

00-01-1184-03 • NMED FACILITY # 28600

CURRENT GROUND WATER ANNALYSIS RESULTS

			ORGANICS										INORO	GANIC	CS			INDICATORS		
LOCATION	DATE SAMPLED	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	EDB	EDC	TMB	NAPHTHALENE	IRO	N	PHOSPHATE	SULFIDE	ALKALINITY as CaCO.	DISS 02	NITRATE	Hd	CONDUCTIVITY	TEMP
UNITS STANDAR	DS	μg/l <u>10</u>	μg/l <u>750</u>	μg/l <u>750</u>	μg/l <u>620</u>	μg/l <u>100</u>	μg/l <u>0.1</u>	ug/l <u>10</u>	μg/l	μg/l <u>30</u>	mg SOLUBLE		mg/l	mg/l	mg/l	mg/l	mg/l		µmhos/cm	°C
MW - 1B	9/21/00	20	5.2	1100	<1105	< 5.0	< 5.0	< 5.0	1270	230	0.4	0.8	0.2	0.0	250	0.5	0.2	7.02	661	23.2
MW - 3A	9/21/00	490	< 20	28	<40	< 20	< 20	< 20	<40	130	3.0	3.0	1.5	0.0	350	1.0	0.2	6.55	883	23.1
MW - 4A	9/21/00	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	2.0	4.0	1.0	0.0	175	1.0	0.2	6.68	900	22.5
MW - 5	9/21/00	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	1.5	5.0	2.0	0.0	200	2.0	0.2	6.87	738	21.7
MW - 6	9/21/00	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	4.0	4.0	5.0	0.0	250	0.5	8.0	6.47	844	19.9
MW - 10	9/21/00	100	< 5.0	230	<125	< 5.0	< 5.0	< 5.0	73.5	62	5.0	6.0	0.6	0.1	250	0.5	0.4	6.81	801	24.3
MW - 11	9/21/00	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	1.0	1.5	4.0	0.0	175	0.5	0.1	6.76	766	22.1
Rinsate	9/21/00	1.1	< 1.0	2.9	< 3.0	< 1.0	< 1.0	< 1.0	< 2.1	1.6	*	*	*	*	*	*	*	*	*	*
Trip Blank	9/21/00	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	*	*	*	*	*	*	*	*	*	*
VM-1	3/23/01	970	< 100	2300	930	< 100	< 100	< 100	180	700	18	20	0.0	10	400	1.0	0.1	6.81	41.0	16.8
VM-2	3/23/01	140	8.7	1200	81.1	< 1.0	< 1.0	< 1.0	17.3	390	8.0	10	0.1	4.0	500	1.0	0.4	7.22	46.5	17.1
AS-1	3/23/01	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	1.5	1.5	0.0	4.0	150	1.0	0.2	7.61	57.0	18.9
FTW-1	3/23/01	35	< 5.0	120	18	< 5.0	< 5.0	< 5.0	< 10.0	50	14	15	2.0	2.0	550	1.5	0.4	7.20	72.5	17.9
FTW-2	3/23/01	8.3	< 1.0	61	160	< 1.0	< 1.0	< 1.0	207	29	9.0	10	0.0	3.0	250	0.0	1.0	7.45	70.1	17.3
FTW-3	3/23/01	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	2.0	3.0	0.3	1.5	300	1.0	1.5	7.59	80.7	16.3
FTW-5	3/23/01	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	1.0	3.0	8.0	0.0	200	1.5	0.6	7.30	83.3	17.8
FTW-6	3/23/01	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	2.9	6.0	7.0	1.5	0.0	350	2.0	1.0	7.81	106.1	17.4
FTW-7	3/23/01	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	2.0	3.0	1.0	5.0	250	2.0	8.0	7.65	68.3	16.3
FTW-8	3/23/01	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	1.8	1.5	3.0	1.5	9.0	350	2.0	1.5	7.43	84.5	18.2
FTW-9	3/23/01	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	<1.0	3.0	3.0	0.4	1.0	550	1.0	1.5	7.61	68.3	18.4
Trip Blank	3/21/01	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	*	*	*	*	*	*	*	*	*	*

* - Not Sample	d
Data checked	//

Hydrogeologic Investigation

Old Horn Site 430 ISLETA BLVD., SW

> ALBUQUERQUE, BERNALILLO COUNTY, NM

APPENDICES - VOLUME I

APPENDIX A - BOREHOLE LITHOLOGIC LOGS

APPENDIX B - HEALTH AND SAFETY PLAN

APPENDIX C - HYDROCARBON SPILL MAS ESTIMATES

APPENDIX D - LABORATORY ANALYTICAL REPORTS



APPENDIX A

Borehole Lithologic Logs

SITE ID: ISLETA-OLD HORN
CLIENT: BCEHD

Well/Borehole ID: **B-1**

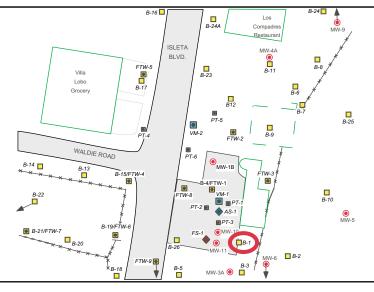
DATE OF DRILLING: 10-12-00

LOGGED BY: T. Chavez/W. Brown DRILLER: H. Reichert/Rodgers

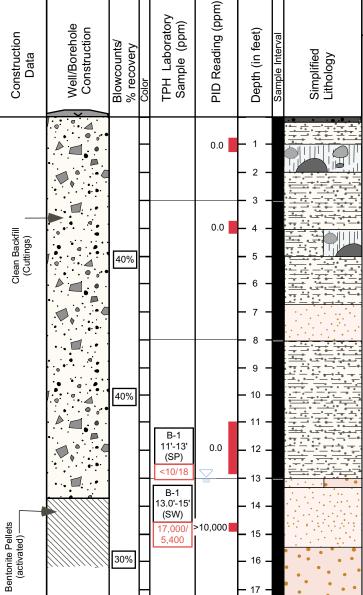
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger SAMPLING METHOD: 3" Dia. 5' Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: ~13'
TOTAL DEPTH: 18'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



18

19

TD = 18'

Surface Conditions: Gravel

0.0'-1.0' Hand Auger (**SM**) Hand auger, silty sand, slightly moist, no hydrocarbon odor, light brown (**10YR**).

1.0'-3.0' Hand Auger (**GM**) Gravel sand mixtures, (**5YR**), slightly moist, no hydrocarbon odor, (**fill**?).

3.0'-8.0' Split Spoon 2.0' sample. 0.0'-0.6' (**SM**) Silty sand (**10YR**), slightly moist. 0.6'-2.0' (**SM/GM**) Silty sand gravels present, slightly moist, no hydrocarbon odor, (**10YR**) (**fill**?).

8.0'-13.0' Split Spoon 2.0' sample. 0.0'-0.1' Slough. 0.1'-2.0' (**SM**) At top, grading to (**SP**) grain size fine to medium coarse, gradational, (**10YR**) tan, slightly moist, (**fill**?).

13.0'-18.0' Split Spoon 1.5' sample. 0.0'-0.5' (**SP/SW**) Well graded changing to poorly graded sand with depth, (**10YR**) tan, slightly moist to wet at base. 0.5'-1.2' (**SP**) Fine sand, gray, very strong hydrocarbon odor, hydrocarbon saturated, diesel like odor, core recovered below water table poor, last 3' sample was not recovered. 1.2'-1.5' (**SW**) Gray poorly sorted fine to coarse sand with ~5% pebble/gravel clasts (rounded), hydrocarbon saturated, unconsolidated, very strong hydrocarbon-diesel odor.

* Borehole likely advanced in former tankhold/backfill area.

Bottom of excavation zone(?)



CLIENT: **BCEHD**Well/Borehole ID: **B-2**

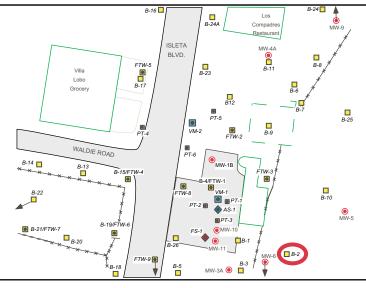
DATE OF DRILLING: 10-12-00

LOGGED BY: T. Chavez/W. Brown DRILLER: H. Reichert/Rodgers

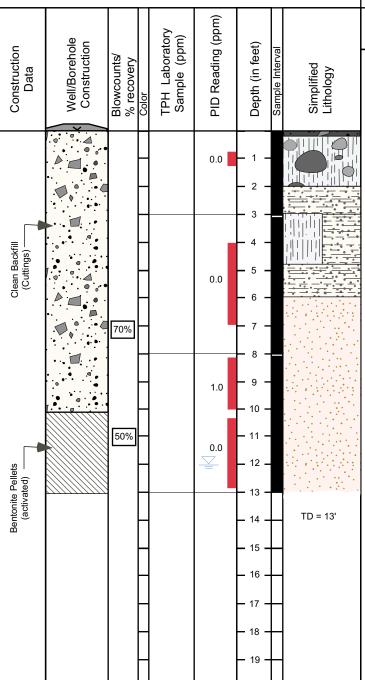
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 3" Dia. 5' Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: 12'
TOTAL DEPTH: 13'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Gravel

0.0'-2.0' Hand Auger (GM) Silty-sandy gravel, (10YR), dark brown, moist, no hydrocarbon odor.

2.0'-3.0' Hand Auger (SM) Silty sand, slightly moist, (10YR), tan, no hydrocarbon odor, minor pebbles.

3.0'-8.0' Split Spoon 3.5' sample. 0.0'-1.8' (ML/SM) Silt-sand (10YR) tan, slightly moist. 1.8'-2.5' (SM) Silty sand very fine to fine, slightly moist. 2.5'-3.5' (SP) Poorly graded sand, fine, slightly moist (10YR) tan, no hydrocarbon odor.

8.0'-13.0' Split Spoon 2.5' sample. 0.0'-1.5' (**SP**) Same as above (**10YR**) tan, fine grained, moist. 1.5'-2.5' (**SP**) Medium to coarse grained, moist, gray at base (**10YR**) tan, weak hydrocarbon odor at base, unconsolidated.



CLIENT: **BCEHD**Well/Borehole ID: **B-3**

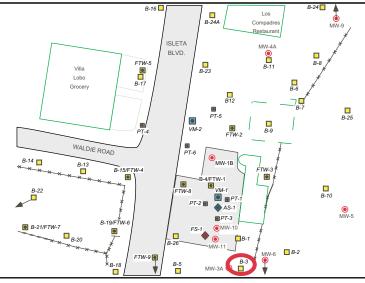
DATE OF DRILLING: 10-12-00 LOGGED BY: T. Chavez

DRILLER: H. Reichert/Rodgers

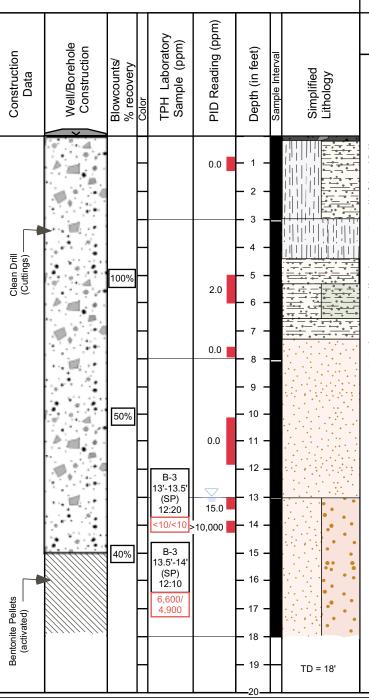
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 3" Dia. 5' Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: 13'
TOTAL DEPTH: 18'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Gravel

<u>0.0'-2.0' Hand Auger</u> (ML/SM) Silty very fine sand, (10YR) tan, slightly moist, no hydrocarbon odor.

2.0'-3.0' Hand Auger (ML/SM) Same as above.

3.0'-8.0' Split Spoon 5.0' sample. 0.0'-1.4' (ML) (10YR) Tan, slightly moist, very fine sand. 1.4'-2.2' (SM) (10YR) Tan, fine sand, slightly moist. 2.2'-3.6' (SM/SC) (5YR) Dark brown, slightly moist CaCO₃. 3.6'-4.1' (SM) Very fine sand (10YR) tan, slightly moist. 4.1'-5.0' (SP) Fine grained sand (10YR) tan, moist, gradational contacts.

8.0'-13.0' Split Spoon 2.5' sample. (**SP**) (**10YR**) Tan, fine grained sand, moist, no hydrocarbon odor at 2.3, 0.5" layer of (**ML/SC**) moist (**5YR**) dark brown, no hydrocarbon odor, unconsolidated.

13.0'-18.0' Split Spoon 2.0' sample. (**SW**) Medium to coarse sand (**10YR**) tan at top and gradually turning to gray, hydrocarbon saturated, water saturated, strong hydrocarbon odor.



CLIENT: **BCEHD**

10-12-00 LOGGED BY: T. Chavez

SAMPLING METHOD: 3" Dia. 5' Long core Barrel

DEPTH TO WATER: ~13' <u> 18'</u> TOTAL DEPTH:

SCREEN:

MW-4A B-11 Well/Borehole ID: B-4/FTW-1 □ B-23 B-17 Lobo Grocery DATE OF DRILLING: DRILLER: H. Reichert/Rodgers **BOREHOLE DIAMETER:** WALDIE ROAD **DRILLING METHOD:** Hollow Stem Auger B-14 🔲 TOP OF CASING ELEV: NA CASING: 0-9' 2" Dia. Sched 40 PVC Blank 10'-19' 0.01 Slot Sched 40 PVC 2" Dia. SURFACE COMPLETION: 8X12" Can with Concrete Pad **USCS - LITHOLOGIC DESCRIPTION**

Surface Conditions: Asphalt

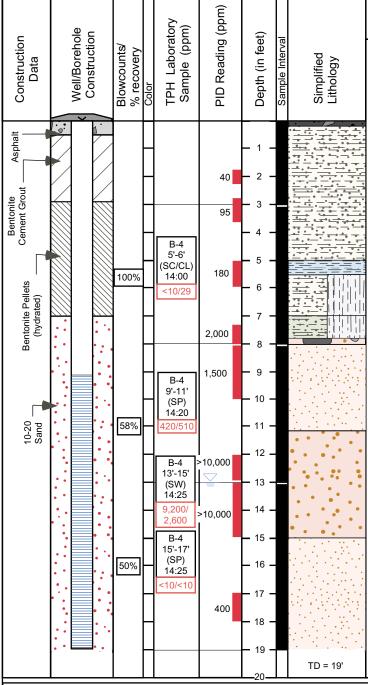
0.0'-0.2' Hand Auger (SM) Silty medium grained sand (5YR) dark brown, no hydrocarbon odor, slightly moist.

0.2'-3.0' (SM) Same as above.

3.0'-8.0' Split Spoon 5' sample. 0.0'-2.0' (SM) (10YR) Dark gray fine grained sand, moist. 2.0'-2.5' (CL) (10YR) Gray slightly moist sandy clay, very slightly plastic, dense. 2.5'-4.0' (SM/ML) Silty sand (10YR) brown, moist, slight hydrocarbon odor. 4.0'-4.7' (SC/ML) Dense (10YR) brown clayey sandy silt, moist, moderate to strong hydrocarbon odor, weak to moderate plasticity, moist, grades abruptly to: 4.7'-5.0' (GW) Gray fine to coarse sand, slightly moist with ~20-30% pebble gravel clasts, unconsolidated, very strong hydrocarbon odor.

8.0'-13.0' Split Spoon 2.9' sample. 0.0'-2.1' (SP) Gray, well sorted, unconsolidated fine grained sand, slightly moist, very strong hydrocarbon gas odor grades to; 2.1'-2.9' (SW) Gray (N5) fine to coarse sand with ~5% 1/2 rounded gravel clasts, unconsolidated, moist, very strong hydrocarbon odor.

13.0'-18.0' Split Spoon 2.5' sample. 0.0'-1.4' (SW) Gray (N5) gravelly sand, unconsolidated, water saturated, very strong hydrocarbon odor. 1.4'-2.5' (SP) Gray (N5) well sorted fine grained sand, moist to wet, moderate hydrocarbon odor lessens with depth but still strong.





CLIENT: **BCEHD**Well/Borehole ID: **B-5**

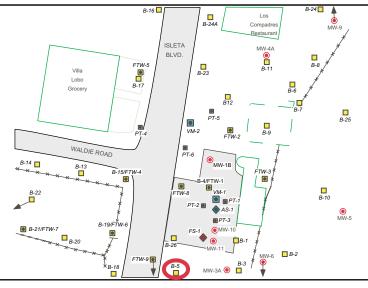
DATE OF DRILLING: 10-13-00 LOGGED BY: T. Chavez

DRILLER: <u>H. Reichert/Rodgers</u>

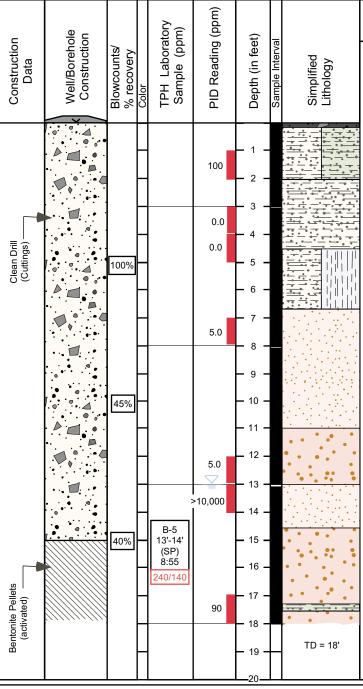
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger SAMPLING METHOD: 3" Dia. 5' Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: 13'
TOTAL DEPTH: 18'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Gravel

0.0'-2.0' Hand Auger (**SM/SC**) Silty clayey sand, low to medium plasticity (**10YR**) brown, moist, low hydrocarbon odor.

2.0'-3.0' Hand Auger (SM) Silty sand, (10YR) brown, moist. **3.0'-8.0'** Split Spoon 5.0' sample. 0.0'-1.5' (SM) (10YR) Silty very fine sand, (10YR), tan, moist, minimum hydrocarbon odor. 1.5'-2.5' (SM/ML) Silty very fine sand (10YR) brown, CaCO₃ nodules, no hydrocarbon odor. 2.5'-3.5' (SM/ML) Silty very fine sand (10YR) brown, CaCO₃ nodules, no hydrocarbon odor. 3.5'-5.0' (SP) (10YR) Tan, well sorted sand, no hydrocarbon odor, moist, unconsolidated.

8.0'-13.0' Split Spoon 2.5' sample. (**SP**) (**10YR**) Tan, fine grained sand, moist, at base, gradually grading to (**SW**) gravelly sand, moist (**10YR**) tan, moist, unconsolidated, no hydrocarbon odor.

13.0'-18.0' Split Spoon 2.0' sample. 0.0'-0.8' (**SP**) Fine sand (**N5**) gray, hydrocarbon saturated, water saturated, strong hydrocarbon odor. 0.8'-2.0' (**SW**) Gravelly sand, (**N5**) gray, (**SC**) layer at base, then continued with (**SW**), moderate hydrocarbon odor, unconsolidated.



CLIENT: **BCEHD**Well/Borehole ID: **B-6**

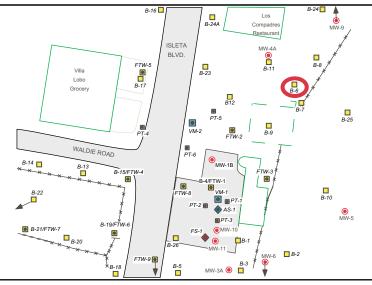
DATE OF DRILLING: 10-13-00 LOGGED BY: T. Chavez

DRILLER: <u>H. Reichert/Rodgers</u>

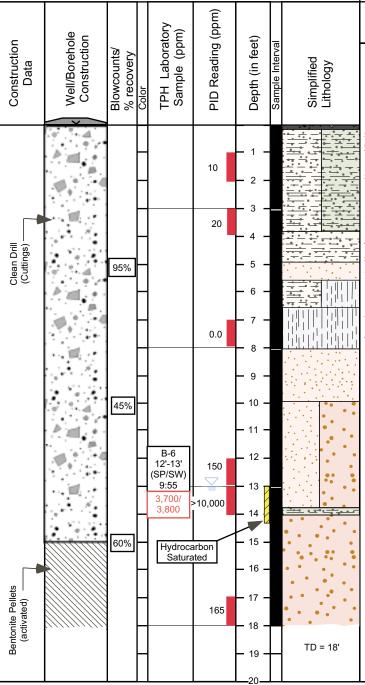
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger SAMPLING METHOD: 3" Dia. 5' Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: 13'
TOTAL DEPTH: 18'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Gravel

0.0'-3.0' Hand Auger (SM/SC) Silty clayey sand, (10YR) dark brown, moist, gravel present, weak to moderate plasticity. **3.0'-8.0' Split Spoon** 4.5' sample. 0.0'-0.8' (SM/SC) (10YR) Dark brown, clayey silty sand, moist. 0.8'-1.8' (SM) Silty sand (10YR) brown, moist, no hydrocarbon odor. 1.8'-2.5 (SP) Well sorted fine sand, moist, (10YR) tan, no hydrocarbon odor. 2.5'-3.5' (SM/ML) Silty fine sandy silt, (10YR) tan-brown, moist. 3.5'-4.5' (ML) Very fine sand, (10YR) brown, low plasticity.

8.0'-13.0' Split Spoon 2.5' sample. 0.0'-1.5' (**SP**) Fine grained sand, (**10YR**) brown-tan, moist, strong hydrocarbon odor. 1.5'-2.5' (**SP/SW**) gravelly sand, (**10YR**) tan moist, unconsolidated, slight hydrocarbon odor.

13.0'-18.0' Split Spoon 3.0' sample. 0.0'-0.8' (**SP/SW**) Fine to medium coarse grained sand, (**N5**) gray, hydrocarbon saturated, water saturated, strong hydrocarbon odor. 0.8'-1.1' (**SC**) Clayey sand (**10YR**) brown, moist, strong hydrocarbon odor. 1.1'-3.0' (**SW**) Gravelly sand (**N5**) gray, moist, strong hydrocarbon odor.



CLIENT: **BCEHD**Well/Borehole ID: **B-7**

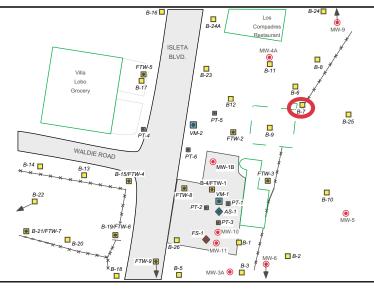
DATE OF DRILLING: 10-13-00 LOGGED BY: T. Chavez

DRILLER: <u>H. Reichert/Rodgers</u>

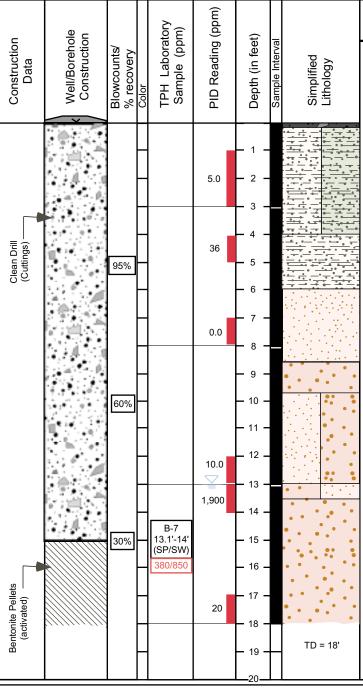
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger SAMPLING METHOD: 3" Dia. 5' Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: 13'
TOTAL DEPTH: 18'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Gravel 0.0'-3.0' Hand Auger (SM/SC) (10YR) Dark brown, moist, moderate hydrocarbon odor, silty clayey sand, moderate plasticity.
3.0'-8.0' Split Spoon 4.5' sample. 0.0'-1.0' (SC/SM) Clayey silty sand, (10YR) dark brown, moist. 1.0'-3.0' (SM) (10YR) Brown, moist, slight hydrocarbon odor, silty sand. 3.0'-4.5' (SP) Well sorted very fine sand, moist, no hydrocarbon odor, (10YR) tan.
8.0'-13.0' Split Spoon 3.0' sample. 0.0'-0.6' (SP) Fine sand, well sorted, (10YR) tan-brown, no hydrocarbon odor, moist, unconsolidated, gradually grading to; 0.6'-1.6' (SW) Gravelly sand, poorly sorted, moist, (10YR) tan brown, no hydrocarbon odor. 1.6'-3.0' (SP/SW) Fine sand with gravels, moist, (10YR) tan, no hydrocarbon odor.

13.0'-18.0' Split Spoon 1.5' sample. 0.0'-0.5' (**SW/SP**) Sandy gravels, poorly sorted, hydrocarbon saturated, water saturated, (**N5**) gray, strong hydrocarbon odor. 0.5'-1.5' (**SW**) Gravelly sand, strong hydrocarbon odor, (**N5**) gray, poorly sorted.



CLIENT: **BCEHD**Well/Borehole ID: **B-8**

DATE OF DRILLING: 10-13-00

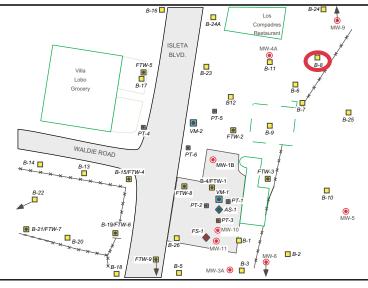
LOGGED BY: T. Chavez/ W. Brown DRILLER: H. Reichert/Rodgers

BOREHOLE DIAMETER: 8"

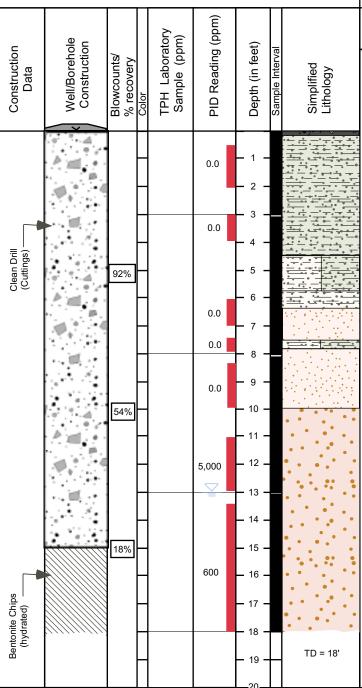
DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 3" Dia. 5' Split Spoon

TOP OF CASING ELEV: Not Available

DEPTH TO WATER: 12'
TOTAL DEPTH: 18'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Gravel

0.0'-3.0' Hand Auger (SC) (10YR) Dark brown, clayey sand, low plasticity, moist, gravel present at ≤ 5%, no hydrocarbon odor. **3.0'-8.0' Split Spoon** 4.6' sample. 0.0'-4.0' Coarsening downwards sequence. 0.0'-1.5' (SC) Dark brown (10YR) dense, non plastic, clayey very fine sand, slightly moist, no hydrocarbon odor, grades to; 1.5'-2.5' (SM/SC) Clayey silty very fine sand, weakly cemented with CaCO₃, non plastic, brown (10YR) slightly moist, no odor, grades to; 2.5'-2.8' (SM) Silty very fine sand, then to (SP). 2.8'-4.0' Tan fine to very fine grained unconsolidated sand. 4.0'-4.4' (SM/ML) Tan, silt-sand mixture. 4.4'-4.6' (SP) As above, weak hydrocarbon odor.

8.0'-13.0' Split Spoon 2.7' sample. 0.0'-0.5' (**SP**) Medium grained, tan, unconsolidated grading to; 0.5'-2.7' (**SW**) Tan (**10YR**) medium to coarse grained sand with ~10-15% pebbles and gravel clasts, moist in lower 1/3 of sample, lower 2" of sample is very moist, gray (**N5**) with strong hydrocarbon odor.

13.0'-18.0' Split Spoon 0.4' sample. **(SW)** Gravelly medium to coarse sand, water saturated, very strong hydrocarbon odor, unconsolidated. Driller reports gravel to total depth.



CLIENT: **BCEHD**Well/Borehole ID: **B-9**

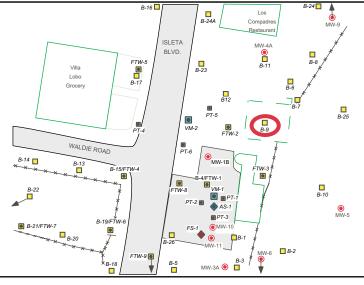
DATE OF DRILLING: 11-28-00 U. Brown

DRILLER: <u>H. Reichert/Rodgers</u>

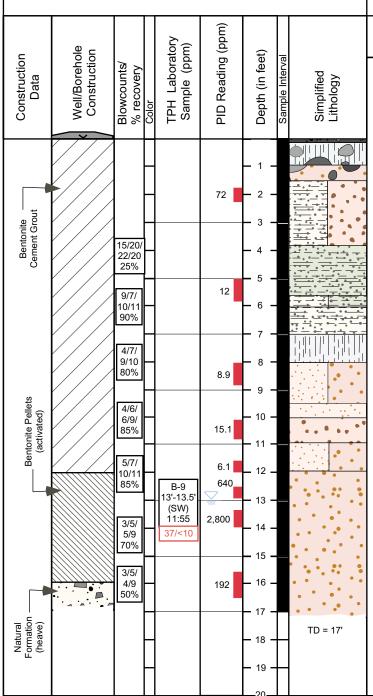
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 3" Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: ~13'
TOTAL DEPTH: 17'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Gravel parking lot **0.0'-1.0** (GM) Silty sandy gravel (fill).

1.0'-1.5' (GW) Sandy gravel (fill).

1.5'-3.0' (SM/SW) Silty fine to coarse sand, fill with concrete chunks.

3.0'-5.0' Split Spoon 0.5' sample. 0.0'-0.3' Concrete chunks. 0.3'-0.5' (**SC**) Brown (**10YR**), clayey very fine sand, dense, weak plasticity, moist, no hydrocarbon odor.

5.0'-7.0' Split Spoon 1.8' sample. 0.0'-1.0' (**SC**) Dark brown, clayey, very fine sand, dense, slightly plastic grading to (**SM/SC**) silty clayey very fine to fine grained sand with CaCO₃ nodules and cement (**Stage 2+**) at base, slightly moist. 1.0'-1.8' (**SM**) (**7.5YR**) Silty very fine sand, unconsolidated to slightly consolidated, no apparent hydrocarbon odor, slightly moist.

7.0'-9.0' Split Spoon 1.6' sample. 0.0'-1.0' (**ML**) Light brown (**10YR**) silt with trace clay, soft, slightly moist, no apparent hydrocarbon odor. 1.0'-1.6' (**SP/SW**) Tan-brown (**10YR**) medium sand with minor fine and coarse component, unconsolidated, trace minor pebbles, slightly moist, weak hydrocarbon odor(?).

9.0'-11.0' Split Spoon 1.7' sample. 0.0'-0.4' (**ML**) Slough from above. 0.4'-0.7' (**SP/SW**) As above. 0.7'-1.1' (**SP**) Tan-brown (**10YR**) medium grained sand. 1.1'-1.7' (**SW**) Tan-gray medium to coarse sand with minor fine sand and pebble clasts, unconsolidated, slightly moist, no apparent hydrocarbon odor.

11.0'-13.0' Split Spoon 1.7' sample. 0.0'-0.7' (**SP/SW**) Tanbrown as above. 0.7'-1.7' (**SW**) Tan-brown to gray (**N5**) at very base, fine to coarse sand, very moist at base, moderate hydrocarbon odor at base, unconsolidated.

13.0'-15.0' Split Spoon 1.4' sample. 0.0'-1.4' (**SW**) As above, gray (**N6-N5**), water saturated, strong hydrocarbon odor but not hydrocarbon saturated.

15.0'-17.0' 1.0' sample. 0.0'-1.0' (**SW**) As above, gray, moderate hydrocarbon odor, water saturated, unconsolidated.



CLIENT: **BCEHD**Well/Borehole ID: **B-10**

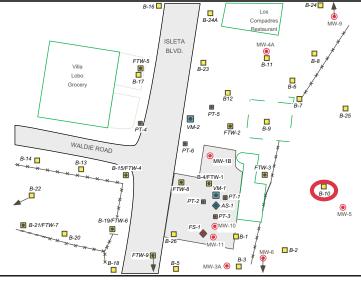
DATE OF DRILLING: 11-28-00 LOGGED BY: T. Chavez

DRILLER: <u>H. Reichert/Rodgers</u>

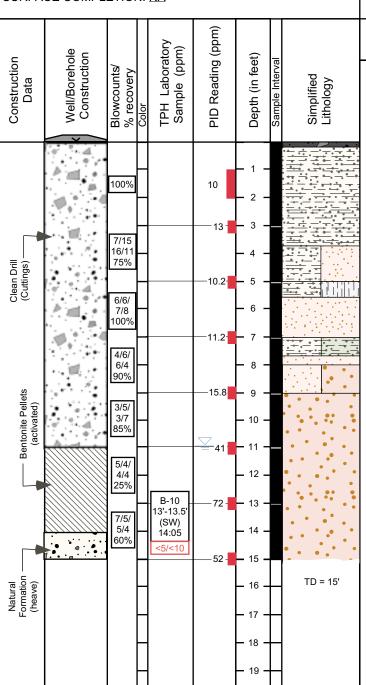
BOREHOLE DIAMETER: 8'

DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 2' Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: 11'
TOTAL DEPTH: 15'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Gravel-cobbles

0.0'-0.1' Hand Auger (SM) Silty sand, very fine (10YR) brown, moist.

1.0'-3.0' Hand Auger (SM) Silty very fine sand (10YR) brown, moist, no hydrocarbon odor present.

3.0'-5.0' Split Spoon 1.5' sample. 0.0'-0.5' Cave-in at top, (SM/SC) (10YR) dark brown silty clayey sand, moist, no apparent hydrocarbon odor. 0.5'-0.9' (SM) Silty very fine sand, slightly moist unconsolidated, no apparent hydrocarbon odor. 0.9'-1.5' (SM/SP) Silty fine sand, slightly moist, no hydrocarbon odor, well sorted, non plastic (10YR) brown.

5.0'-7.0' Split Spoon 2.0' sample. 0.0'-0.5' (**SM/ML**) Silt, very fine sand, (**10YR**) brown, slightly moist, flour-like, no apparent hydrocarbon odor. 0.5'-2.0' (**SP**) Well sorted fine grained sand, (**10YR**) brown, moist, unconsolidated, no apparent hydrocarbon odor.

7.0'-9.0' Split Spoon 1.8' sample. 0.0'-0.6' (**SM/SC**) Silty clayey fine sand, slightly moist, (**10YR**) dark brown, non plastic, no apparent hydrocarbon odor. 0.6'-1.8' (**SP/SW**) Fine grained sand gradually grading to medium grained sand, (**10YR**) brown, unconsolidated, towards the bottom sand is gradually grading from well sorted to poorly sorted.

9.0'-11.0' Split Spoon 1.7' sample. 0.0'-0.3' (**ML/SM**) Slough from top. 0.3'-1.7' (**SW**) Poorly sorted fine to medium grained sand gradual color change (**10YR**) brown to (**N5**) gray towards the bottom, water saturated, slight hydrocarbon odor, unconsolidated. **11.0'-13.0' Split Spoon** 0.5' sample. 0.0'-0.5' (**SW**) Poorly sorted sand, moist (**N5**) gray, unconsolidated, slight hydrocarbon odor. **13.0'-15.0' Split Spoon** 1.2' sample. 0.0'-1.2' (**SW**) Fine grained gradually grading to coarse/medium grained sand (**N5**) gray, some gravel towards bottom, thumb sized.



CLIENT: **BCEHD**Well/Borehole ID: **B-11**

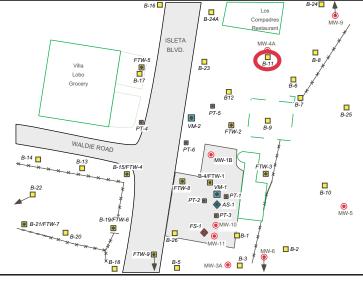
DATE OF DRILLING: 11-28-00 LOGGED BY: T. Chavez

DRILLER: <u>H. Reichert/Rodgers</u>

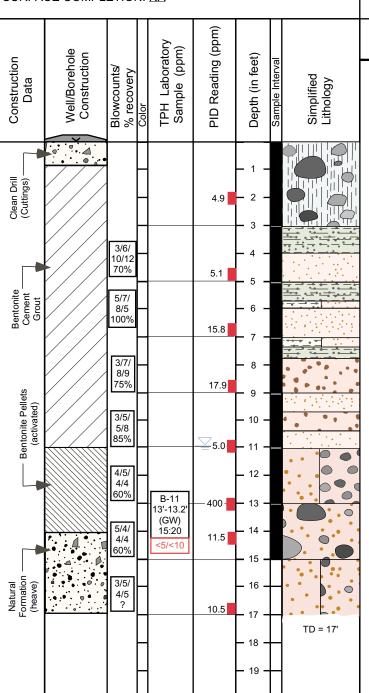
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 2' Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: 11'
TOTAL DEPTH: 17'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Gravel

0.0'-3.0' Hand Auger (**GM**) Silty sandy gravel (**fill**). **3.0'-5.0' Split Spoon** 1.4' sample. 0.0'-0.7' (**SC**) (**10YR**) Dark brown, clayey sand, medium to high plasticity, moist, CaCO₃ present toward center of core. 0.7'-1.4' (**SP**) Well sorted fine grained sand, (**10YR**) brown, moist.

5.0'-7.0' Split Spoon 2.0' sample. 0.0'-0.7' (**SC**) (**10YR**) Dark brown, moist, high plasticity. 0.7'-1.0' (**SM/SP**) Silty fine grained sand, (**10YR**) brown, moist, gradually grading to; 1.0'-2.0' (**SP**) Very fine to fine grained sand (**10YR**) light brown, moist, no apparent hydrocarbon odor, unconsolidated.

7.0'-9.0' Split Spoon 1.5' sample. 0.0'-0.4' (**SM/SC**) Silty clayey sand, (**10YR**) dark brown, moist, medium to low plasticity, no apparent hydrocarbon odor. 0.4'-0.7' (**SC**) Clayey sand, medium to high plasticity (**10YR**) brown, moist. 0.7'-1.5' (**SW**) (**10YR**) Light brown, poorly sorted sand with gravel pea to thumb sized, rounded coarse gravel, moist.

9.0'-11.0' Split Spoon 1.7' sample. Slough at top 0.0'-0.7' (**SP**) Fine to medium grained sand (**10YR**) brown, moist, no apparent hydrocarbon odor. 0.7'-1.2' (**SW**) Poorly sorted sand, (**10YR**) brown medium to coarse grained sand, rusted area within this section. 1.2'-1.7' (**SP**) Fine to medium grained sand (**10YR**) brown, moist, no apparent hydrocarbon odor, water saturated at base.

11.0'-13.0' Split Spoon 1.2' sample. (**SW/GP**) Poorly sorted sand with gravel pea to thumb sized, rounded (**10YR**) brown, moist, unconsolidated (**N5**) gray at bottom of barrel, no apparent hydrocarbon odor.

13.0'-15.0' Split Spoon 1.2' sample. 0.0'-1.2' (**SW/GW**) Poorly sorted gravelly sand, pea to thumb sized gravel towards bottom (**10YR**) brown.



CLIENT: **BCEHD**Well/Borehole ID: **B-12**

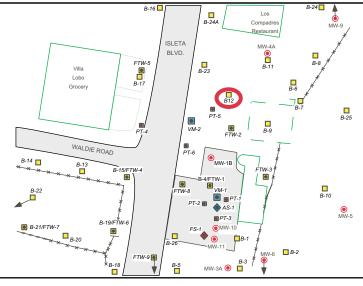
DATE OF DRILLING: 11-28-00 LOGGED BY: T. Chavez

DRILLER: <u>H. Reichert/Rodgers</u>

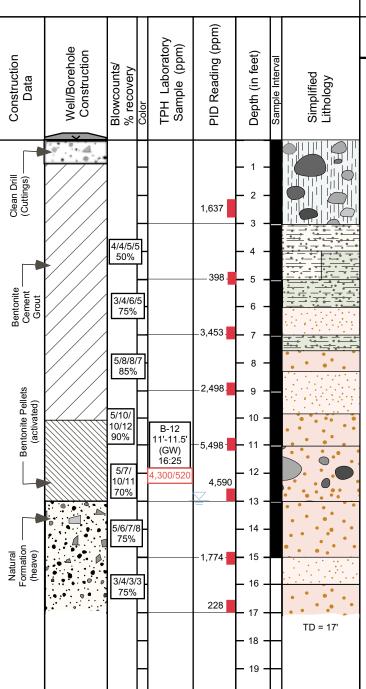
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 2" Split Spoon/Posthole

TOP OF CASING ELEV: NA
DEPTH TO WATER: 13'
TOTAL DEPTH: 17'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt

0.0'-3.0' Hand Auger (GM) Silty sandy gravel (fill).

3.0'-5.0' Split Spoon 1.0' sample. 0.0'-0.5' (**SM**) Silty sand, non plastic (**10YR**) dark brown, slight hydrocarbon odor. 0.5'-1.0' (**SM/SC**) Silty clayey sand, low plasticity, (**10YR**) dark brown, moderate hydrocarbon odor, moist.

5.0'-7.0' Split Spoon 1.5' sample. 0.0'-0.8' (**SC**) Clayey fine sand, medium plasticity (**10YR**) dark brown, dense, gradually grading to; 0.8'-1.5' (**SP**) Well sorted, very fine sand (**10YR**) brown, moderate hydrocarbon odor, flour-like appearance and feel

7.0'-9.0' Split Spoon 1.7' sample. 0.0'-0.5' (**SC**) Clayey sand, dense, high plasticity (**10YR**) dark brown, moist. 0.5'-1.2' (**SW**) Poorly sorted fine to medium grained sand (**10YR**) brown, some pea sized cobbles/gravel present. 1.2'-1.7' (**SP**) Medium grained well sorted sand (**10YR**) brown, moist, moderate hydrocarbon oder.

9.0'-11.0' Split Spoon 1.8' sample. 0.0'-0.8' (**SP**) Well sorted medium grained sand (**10YR**) brown, moist, unconsolidated, moderate hydrocarbon odor. 0.8'-1.8' (**SW**) Poorly sorted medium to coarse grained sand with pea to thumb sized gravel clasts (sub rounded to sub angular) unconsolidated, moist.

11.0'-13.0' Split Spoon 1.4' sample. 0.0'-1.4 (**GW**) Poorly sorted gravel, (**N5**) gray, water saturated, hydrocarbon saturated, strong odor (**10YR**) pea to thumb sized gravels present.

13.0'-15.0' Split Spoon 1.5' sample. 0.0'-1.5' (SW) Medium to fine grained sand with sub rounded gravels present, poorly sorted, (N5) gray, moderate to weak hydrocarbon odor, moist.

15.0'-17.0' Split Spoon 1.5' sample 0.0-0.8' (**SP**) Well sorted fine grained sand, moist, (**10YR**) brown. 0.8'-1.5' (**SW**) Poorly sorted medium to coarse grained sand (**10YR**) brown.



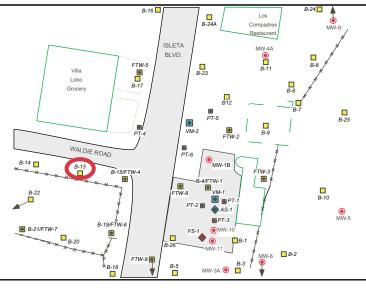
CLIENT: **BCEHD**Well/Borehole ID: **B-13**

DATE OF DRILLING: 01-29-01
LOGGED BY: S. Grietens
DRILLER: Stan/Nevex

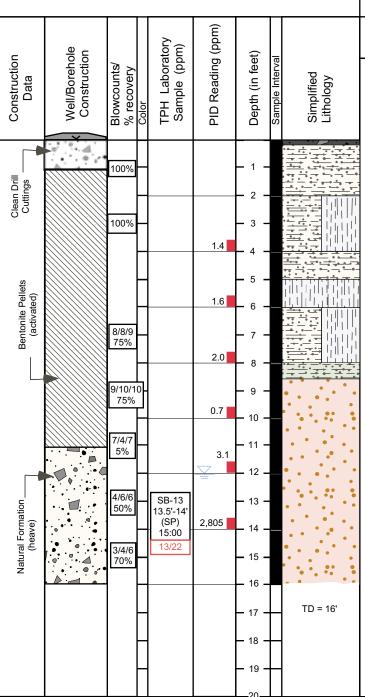
BOREHOLE DIAMETER: 7"

DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 2" Dia. 2' Long Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: ~12'
TOTAL DEPTH: 16'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Gravel/road base ~3"

 $\underline{\textbf{0.3'-2.0'}}$ (SM) (10YR 5/3) 100% Fine grained silt-sand, dry, no odor.

2.0'-4.0' (SM/ML) (10YR 5/3) 100% Fine grained silty sands, dry, no odor.

4.0'-6.0' (10YR 5/3) 75% 0.0'-0.75' (SM) (10YR 5/3) Very fine silty sand, hard, crumbles, dry, varies back and forth, clayey. 0.75'-1.5' (ML) (10YR 8/3) Very fine silt, dry, soft, no odor.

6.0'-8.0' (SM/ML) 75% Very fine silts, sands to medium sands, varying back and forth, 1-2% coarse sand, fine to medium gravel with fines, soft, no odor, slight moisture.

8.0'-10.0' 75% 0.0-0.5' (**SC**) (**5YR 4/6**) Hard clayey sand/silt, slightly moist, no odor, <1% coarse sand. 0.5'-1.5' (**SW**) (**10YR** 5/3) Fine silty sand to coarse sand 1-2% fine gravel, slight moisture, no odor.

10.0'-12.0' (SW) 5% As (8.0'-10.0'(0.5'-1.5')) above.

12.0'-14.0' (SW) (N3) **50%** Fine to medium to coarse sands, 1-2% gravel, strong odor.

14.0'-16.0' (**SW**) (**70%**) (**N5 - 10YR 5/3**) Grading in color back to (**10YR 5/3**).



SITE ID: **ISLETA-OLD HORN** CLIENT: **BCEHD**

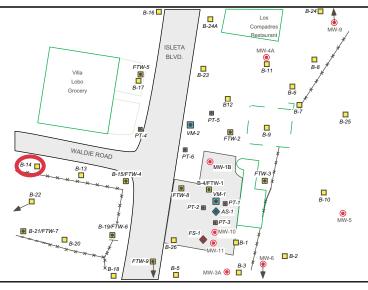
Well/Borehole ID: B-14

DATE OF DRILLING: 01-29-01 LOGGED BY: S. Grietens DRILLER: Stan/Nevex

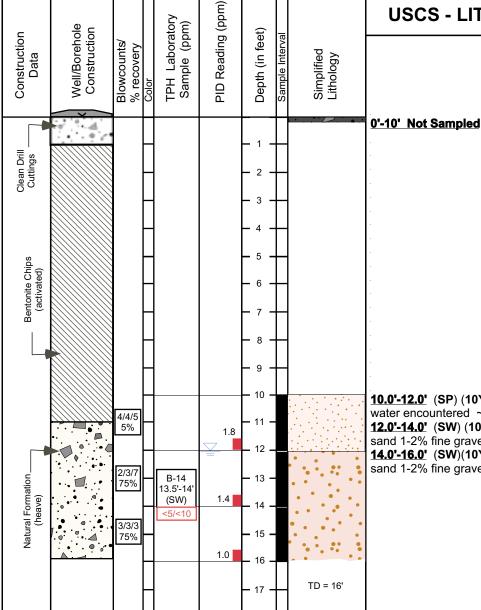
BOREHOLE DIAMETER:

Hollow Stem Auger **DRILLING METHOD:** SAMPLING METHOD: 2" Dia. Split Spoon

TOP OF CASING ELEV: NA **DEPTH TO WATER:** ~12' TOTAL DEPTH: 16' CASING: NA SCREEN: NA SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



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19

10.0'-12.0' (SP) (10YR 6/8) 5% Well sorted fine to medium sand, water encountered ~12', no odor_

12.0'-14.0' (SW) (10YR 6/8) 75% Well graded fine to coarse sand 1-2% fine gravel, no odor.

14.0'-16.0' (SW)(10YR 5/3) 75% Well graded fine to coarse sand 1-2% fine gravel, no odor.



CLIENT: BCEHD

Well/Borehole ID: B-15/FTW-4

DATE OF DRILLING: 01-30-01
LOGGED BY: S. Grietens
DRILLER: Stan/Nevex

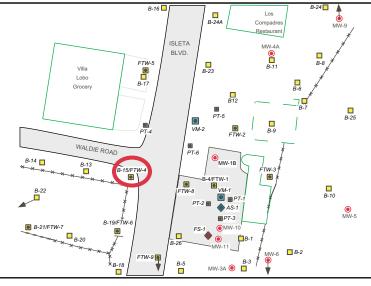
BOREHOLE DIAMETER: 7"

DRILLING METHOD: Hollow Stem Auger/Short Mast Rag

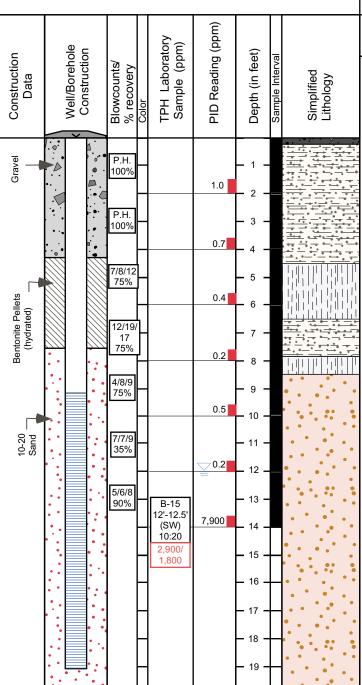
SAMPLING METHOD: 2" Dia. Split Spoon

TOP OF CASING ELEV: NA DEPTH TO WATER: \sim 12' TOTAL DEPTH: 20'

CASING: 0-9' 2" Dia. Sched 40 PVC Blank
SCREEN: 9'-19' 2" Dia. .01 Slot Sched 40 PVC
SURFACE COMPLETION: 8"X12" Manway with concrete Pad



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt

0.0'-2.0' (SM) (10R 3/6) 100% Fine grained silty sand, slight moisture, soft, no odor.

 $\underline{\textbf{2.0'-4.0'}}$ (SM) (10YR 5/3) Fine to medium silty sand, slight moisture, soft, no odor.

4.0'-6.0' 75% 0.0'-0.5' (SM) (10YR 5/3) Fine silty sand, soft, slightly moist, grades quickly to (ML), no odor. 0.5'-2.0' (ML) (10YR 5/3) Very fine silt, firm, slight moisture, almost slight plasticity, no odor.

6.0'-8.0' 75% 0.0'-0.5' (ML) (10YR 5/3) Very fine silt, firm, slight moisture, almost slight plasticity, no odor. 0.5'-1.5. (SM) (10YR 5/3) Fine silty sand, soft, slight moisture, no odor.

8.0'-10.0' 80% 0.0'-0.5' (ML) (**5YR 4/6**) Fine to very fine silt with trace fine sand, firm, slight moisture, almost plastic. 0.5'-1.5' (**SW**) (**10YR 5/3**) Sharp contact, fine to coarse sand, fine gravel, slight moisture, moist at (**ML/SW**)contact, no odor.

10.0'-12.0' (SW) (10YR 5/3) 35% Well graded fine to coarse sand with fine to medium gravel, no odor, slight moisture.
12.0'-14.0' (SW) (N3) 90% Well graded fine to coarse sand, fine to medium gravel, wet, strong hydrocarbon odor.

* Not sampled below 14' due to rig limitations.



TECUMSEH PROFESSIONAL ASSOCIATES, INC.

TD = 20'

CLIENT: **BCEHD**Well/Borehole ID: **B-16**

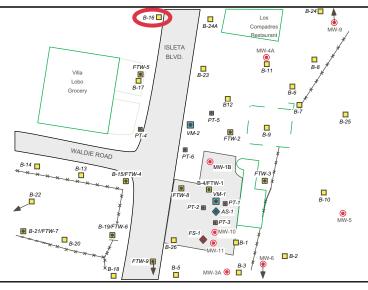
DATE OF DRILLING: 01-30-01
LOGGED BY: S. Grietens
DRILLER: Stan/Nevex

BOREHOLE DIAMETER: 7"

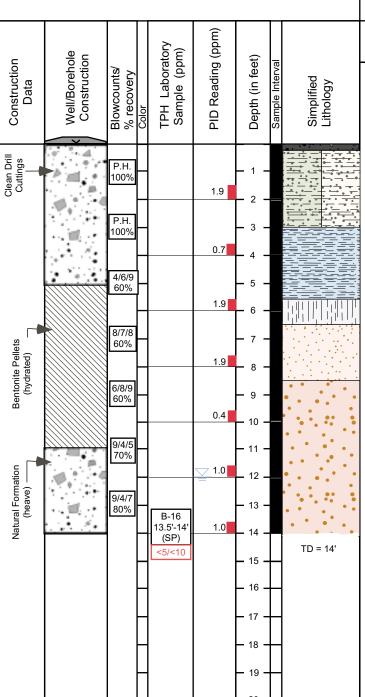
DRILLING METHOD: Hollow Stem Auger

SAMPLING METHOD: Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: ~12'
TOTAL DEPTH: 14'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt/road base.

0.0'-2.0' (SC/SM) (10R 3/3) 100% Grading back and forth - sandy/silt - silty/sand, clayey, slight moisture, none to low plasticity, no odor, soft to firm.

2.0'-4.0' 100% 0.0'-1.0' (**SC/SM**) Same as (0.0'-2.0) above. 1.0'-2.0' (**CL**) (**10YR 5/3**) Clay with fine to medium sands ~10%, trace coarse sand, fine gravel, low to medium plasticity, moist, no odor, firm.

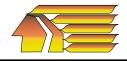
4.0'-6.0' 60% 0.0'-0.9' (CL) (10YR 3/3) Same as (1.0'-2.0') above. 0.9'-1.2' (ML) (10YR 5/3) Very fine sand/silt, soft, slight moisture, well sorted, sharp contact.

6.0'-8.0' 60% 0.0'-0.4 ($\dot{\text{ML}}$) (**10YR 5/3**) Same as (0.9'-1.2') above grading to ($\dot{\text{SP}}$) fine grained sand, trace fines, slight moisture, soft, no odor.

8.0'-10.0' (10YR 5/3) 60% (SP) From above grading to (SW) poorly sorted sands, fine to coarse with <2% fine gravel, slight moisture, no odor, soft.

10.0'-12.0' (**SW**) (**10YR 5/3**) **70%** Fine to coarse sand with some fines, moist, fine to coarse gravel, <5%, no odor, main body of sampling is medium sand.

12.0'-14.0' (SW) (10YR 5/3) 80% Same as above, no odor.



CLIENT: BCEHD

Well/Borehole ID: B-17/FTW-5

 DATE OF DRILLING:
 01-30-01

 LOGGED BY:
 S. Grietens

 DRILLER:
 Stan/Nevex

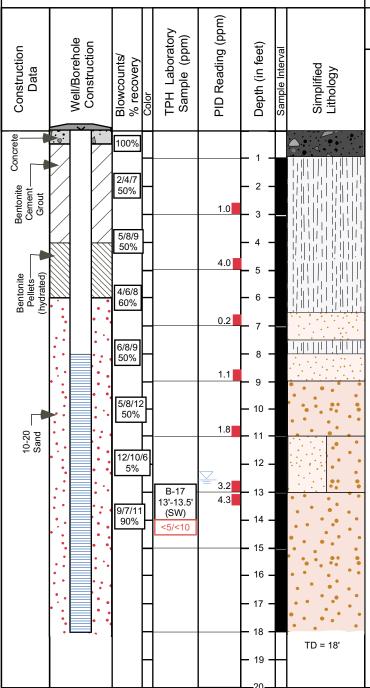
BOREHOLE DIAMETER: 7"

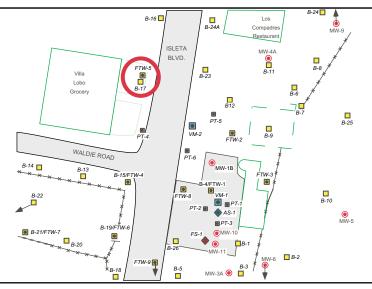
DRILLING METHOD: Hollow Stem Auger

SAMPLING METHOD: Split Spoon
TOP OF CASING ELEV: NA
DEPTH TO WATER: ~12.5'
TOTAL DEPTH: 18'

CASING: 0-8' 2" Dia. Sched 40 PVC

SCREEN: 8'-18' 0.01 SWT 2" Dia. Sched 40 PC SURFACE COMPLETION: 8X12 Manway with Concrete Pad





USCS - LITHOLOGIC DESCRIPTION

Surface Conditions: Asphalt-road base

0.0'-1.0' Asphalt

1.0'-3.0' (ML) (5YR 4/6) 50% Clayey silt, moist, slight plasticity, no odor, trace fine to medium sands, firm.

3.0'-5.0' (ML) (5YR 4/6) 50% Clayey silt, moist, slight plasticity, no odor, trace fine to medium sand, firm.

5.0'-7.0' 60% 0.0'-0.9' **(ML) (5YR 4/6)** Clayey silt, moist, slight plasticity, no odor, trace fine to medium sand, sharp contact, firm. 0.9'-1.2' **(SP) (10YR 6/8)** Fine sand, little to some fines, soft, moist, no odor

7.0'-9.0' 50% 0.0'-0.3' (**SP**) Fine sand, little fines, soft, moist, no odor, soft. 0.3'-0.6' (**ML**) Clayey fine silt, moist, no odor, soft. 0.6'-1.0' (**SP**) Same as (0.0'-0.3') above.

9.0'-11.0' (SW) (10YR 6/8) 50% (SP) Fine to coarse poorly sorted sand, fine to coarse gravel, moist, no odor.

11.0'-13.0' (SP/SW) Very poor recovery - 5%.

13.0'-15.0' (SW) Poorly sorted sand.

*Note: Well FTW-5 set in 2nd borehole advanced approximately 5' north of B-17



CLIENT: **BCEHD**Well/Borehole ID: **B-18**

DATE OF DRILLING: 01-31-01
LOGGED BY: S. Grietens
DRILLER: Stan/Nevex

BOREHOLE DIAMETER: 7"

DRILLING METHOD: Hollow Stem Auger

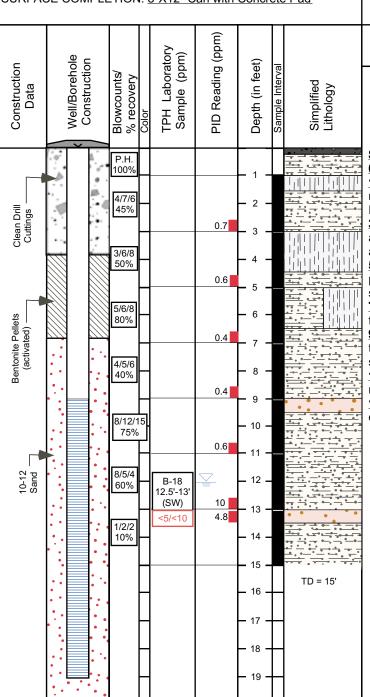
SAMPLING METHOD: Split Spoon
TOP OF CASING ELEV: NA
DEPTH TO WATER: ~12'
TOTAL DEPTH: 20'

CASING: 0-9' 2" Dia. Sched 40 PVC Blank
SCREEN: 9'-19' 2" Dia. 0.01 Slot Sched 40 PVC
SURFACE COMPLETION: 8"X12" Can with Concrete Pad

B-16

| B-24 | B-24 | B-24 | B-24 | B-24 | B-24 | B-25 | B

USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt-road base

0.0'-1.0' Driveway with some gravel/silty (SM) sands.

1.0'-3.0' (**5YR 4/6**) **75%** 0.0'-0.5' (**ML**) Fine clayey silt, firm, slight moisture, trace sand, no odor, no to low plasticity. 0.5'-1.5 (**SM**) Fine silty sand, slight moisture, soft, fines/silts, no odor.

3.0'-5.0' (**5YR** 4/6) **50%** 0.0'-0.8' (**ML**) Same as (0.0'-0.5') above. 0.8'-1.0' (**SM**) Same as (0.5'-1.5') above. These contacts are gradational.

5.0'-7.0' 80% 0.0'-1.6' (**SM/ML**) (**5YR 4/6**) Fine sand/silt, firm, no plasticity, no odor, slight moisture. 1.6'-1.8' (**SM**) Fine silty sand, soft, slight moisture, no odor.

7.0'-9.0' 0.0'-0.8 (SM) (5YR 4/6) 40% Fine sand, trace to some fines, soft, slight moisture, no odor.

9.0'-11.0' (10YR 6/8) 75% 0.0'-0.4' (SW) Fine to medium sands, trace fines, grades to (SM). 0.4'-1.5' (SM) Fine silty sand, moist, soft, no odor.

11.0'-13.0' (SM) (10YR 6/8 - N5) 60% Fine to medium silty sand, moist to wet, gray, odor.

13.0'-15.0' (N**5**) 10% (S**M**) Fine to medium sand, silty, wet, gray, odor, (S**W**) is ~1" thick probably cave-in.



CLIENT: BCEHD

Well/Borehole ID: **B-19/FTW-6**

DATE OF DRILLING: 01-31-01 LOGGED BY: W. Brown

DRILLER: <u>H. Reichert/Rodgers</u>

BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 3" Dia. Split Spoon

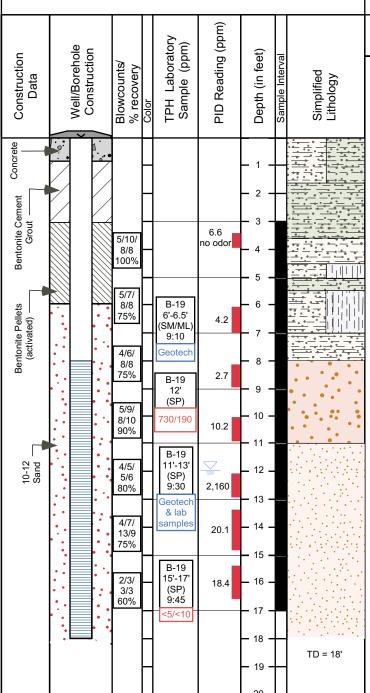
TOP OF CASING ELEV: NA
DEPTH TO WATER: 11.5'-12'
TOTAL DEPTH: 18'

CASING: <u>0-8' 4" Dia. Sched 40 PVC Blank</u> SCREEN: <u>8'-18' 2" Dia. 0.01 Slot Sched 40 PVC</u>

SURFACE COMPLETION: 8X12" Can with Concrete Pad

B-16 B-24A Compadres Restaurant NW-4A BLVD. B-17 B-23 B-17 B-25 PT-5 WALDIE ROAD B-18 B-19/FTW-5 B-20 ANV-10 B-19/FTW-6 B-20 ANV-10 B-20

USCS - LITHOLOGIC DESCRIPTION



0.0'-3.0' Cuttings 0.0'-1.5' (**SM/SC**) Silty clayey very fine sand grading to; 1.5'-3.0' (**SC**) brown clayey sand, no odor. **3.0'-5.0' Split Spoon** 2.0' sample. 0.0'-2.0' Fining downwards sequence. 0.0'-0.6' (**SC**) Dense, non-clayey very fine sand, dark brown grading to; 0.6'-1.3' (**SM**) Silty very fine sand

Surface Conditions: Dirt/loose soil

sand, dark brown grading to; 0.6'-1.3' (**SM**) Silty very fine sand (**7.5YR**) reddish brown. 1.3'-2.0' (**SM/ML**) Silt-very fine sand mixture, tan-brown, slightly moist, no hydrocarbon odor.

5.0'-7.0' Geotech Split Spoon 1.5' sample. 0.0'-0.4' (**SC**) Brown silty clayey very fine sand. 0.4'-1.5' (**SM/ML**) Tan brown (**10YR**) silty-very fine sand mixture, slightly moist, no hydrocarbon odor. **7.0'-9.0' Split Spoon** 1.8' sample. 0.0'-0.2' Cave-in (**SC**). 0.2'-1.0' (**SM**) Tan silty very fine to fine sand, slightly moist, unconsolidated, no apparent hydrocarbon odor, grades to; 1.0'-1.8' (**SW**) Gravelly fine to coarse sand, mostly medium grained with ~15-10% pebbles and gravel up to 1" across.

9.0'-11.0' Split Spoon 1.8' sample. 0.0'-1.8' (**SW**) As above, slightly moist, no hydrocarbon odor, unconsolidated.

11.0'-13.0' Geotech Split Spoon 1.6' sample. 0.0'-1.6' (**SP**) Gray to dark gray (**N4-N3**) fine to medium sand, unconsolidated, water saturated, very strong hydrocarbon odor.

13.0'-15.0' Split Spoon 1.5' sample. 0.0'-1.5' (**SP**) As above, gray (**N6**), moderate to strong hydrocarbon odor.

15.0'-17.0' Split Spoon 1.2' sample. 0.0'-1.2' (**SP**) Brown gray as above with moderate to weak hydrocarbon odor.



CLIENT: **BCEHD**Well/Borehole ID: **B-20**

DATE OF DRILLING: 01-31-01 LOGGED BY: W. Brown

DRILLER: <u>H. Reichert/Rodgers</u>

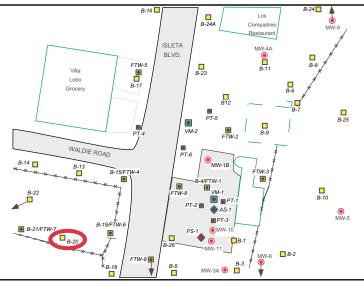
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 3" Dia. Split Spoon

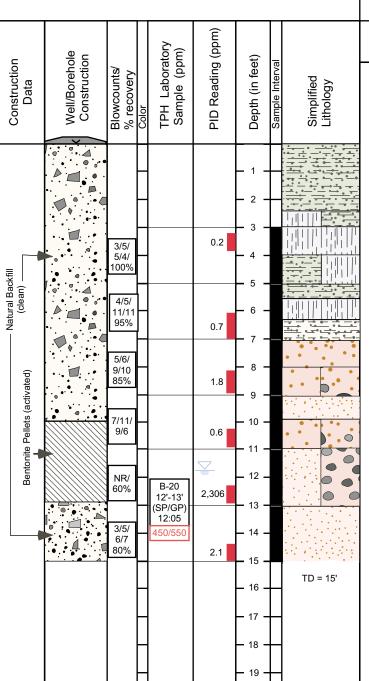
TOP OF CASING ELEV: NA

DEPTH TO WATER: ~11.5'-12'

TOTAL DEPTH: 15'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Loose dirt

0.0'-3.0' Cuttings 0.0'-2.5' (**SC**) Brown clayey very fine sand. 2.5'-3.0' (**ML/SC**) Clayey silt to clayey sand, moist_

3.0'-5.0' Split Spoon 2.0' sample. 0.0'-1.0' (**ML**) Clayey very fine sandy silt, tan-brown (**10YR**) grading to (**SC/ML**) sandy clayey silt, brown (**10YR**) from 1.0'-2.0'.

5.0'-7.0' Split Spoon 1.9' sample. 0.0'-1.9' Coarsening downwards sequence, (**SC**) clayey very fine sand with silt grading to (**ML**) silt, then (**SM**) brown silty very fine sand, slightly moist throughout, plastic at top, no hydrocarbon odor.

7.0'-9.0' Split Spoon 1.7' sample. 0.0'-1.0' (**SW**) Tan-brown orange fine to coarse sand with ~5-10% pebbles, unconsolidated, slightly moist, no hydrocarbon odor, grades to; 1.0'-1.7' (**SW/GW**) Same as above but with ~15-20% rounded gravel clasts to 1.5" across, no hydrocarbon odor.

9.0'-11.0' Split Spoon
1.8' sample. 0.0'-0.6' (SP) Tan (10YR) fine to medium sand, unconsolidated, slightly moist. 0.6'-1.8' (SW/GW) As above, slightly moist, no hydrocarbon odor.
11.0'-13.0' Split Spoon
1.2' sample. 0.0'-1.3' (SP/GP) Gray

(N5) gravelly well sorted medium grained sand, gravel is ~1/2" to 1" across, water saturated, strong hydrocarbon odor, at or near hydrocarbon saturated, leaves spotty sheen in water.

13.0'-15.0' Split Spoon 1.6' sample. 0.0'-1.6' (**SP**) Brown-gray fine to medium sand, weak hydrocarbon odor, unconsolidated, water saturated.



CLIENT: BCEHD

Well/Borehole ID: **B-21/FTW-7**

DATE OF DRILLING: 01-31-01 LOGGED BY: W. Brown

DRILLER: <u>H. Reichert/Rodgers</u>

BOREHOLE DIAMETER: 8"

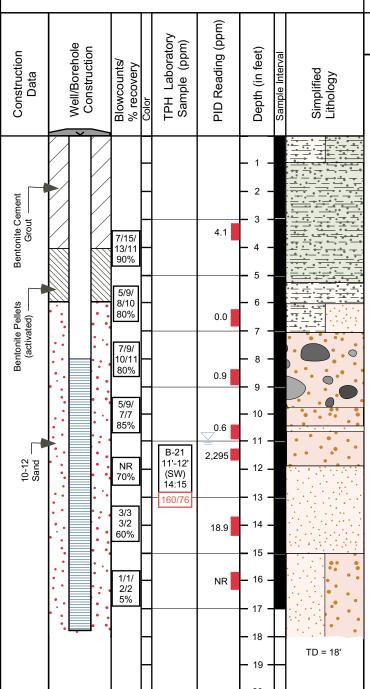
DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 3" Dia. Split Spoon

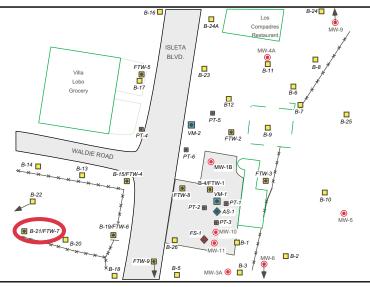
TOP OF CASING ELEV: NA DEPTH TO WATER: 11' TOTAL DEPTH: 18'

 CASING:
 0-8' 2" Dia. Sched 40 PVC Blank

 SCREEN:
 8'-18' 2" Dia. 0.01 Slot Sched 40 PVC

SURFACE COMPLETION: 8X12" Can with Concrete Pad





USCS - LITHOLOGIC DESCRIPTION

Surface Conditions: Dirt

0.0'-3.0' Cuttings 0.0'-1.0' (**SM/SC**) Moist (**10YR**) brown silty clayey very fine sand grading to; 1.0'-3.0' (**SC**) Silty clayey very fine sand, no hydrocarbon odor, non plastic, moist.

3.0'-5.0' Split Spoon 1.8' sample. 0.0'-2.0' (**SC**) Clayey very fine sand, dense, non plastic with CaCO₃ cement, disseminated, no hydrocarbon odor, localized (**SM/SC**), siltier zones.

5.0'-7.0' Split Spoon 1.6' sample. 0.0'-0.2' (**SC**) Dark brown (**10YR**) clayey very fine sand, dense, non plastic, no hydrocarbon odor. 0.2'-1.6' (**SM**) Tan brown (**10YR**) silty very fine sand grading to (**SM/SP**) fine sand with minor silt at base, slightly moist, no hydrocarbon odor.

7.0'-9.0' Split Spoon 1.6' sample. 0.0'-1.6' (**GW**) Fine to coarse sandy gravel, clasts up to 2"+, rounded ~20-30% of interval, matrix supported, unconsolidated, slightly moist, no apparent hydrocarbon odor.

9.0'-11.0' Split Spoon 1.7' sample. 0.0'-0.6' (**GW**) As above, grades to 0.6'-1.7' (**SW**) Tan-brown (**10YR**) fine to coarse sand with ~≤5% pebble and gravel clasts. --one 2" thick medium sand (**SP**) zone from 1.1'-1.3'--, no odor, very moist at base.

11.0'-13.0' Split Spoon 1.4' sample. 0.0'-0.8' (**SW**) As above but dark gray (**N3**) with strong hydrocarbon odor, water saturated, near hydrocarbon saturated. 0.8'-1.4' (**SP**) Gray (**N5**) fine to medium grained sand, unconsolidated, moderate to strong hydrocarbon odor decreases at base.

13.0'-15.0' Split Spoon 1.3' sample. 0.0'-1.3' (**SP**) Gray-brown fine to medium water saturated sand, weak hydrocarbon odor. **15.0'-17.0' Split Spoon** 0.1' sample. 0.1' (**SP/SW**) Fine to coarse sand, unconsolidated, no apparent hydrocarbon odor.



CLIENT: **BCEHD**Well/Borehole ID: **B-22**

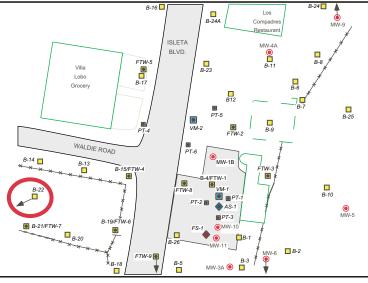
DATE OF DRILLING: 01-31-01 UOGGED BY: W. Brown

DRILLER: <u>H. Reichert/Rodgers</u>

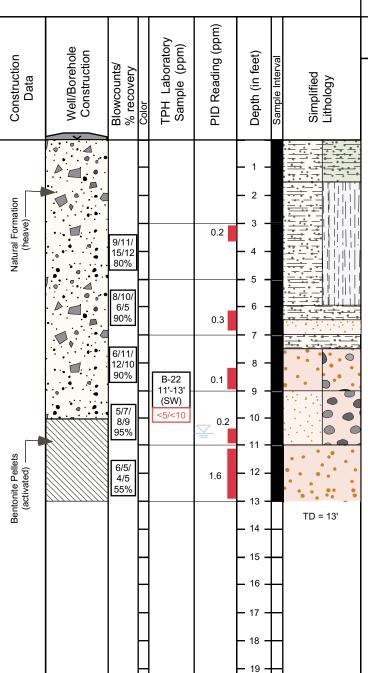
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 3" Dia. 2' Long Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: 10.5'
TOTAL DEPTH: 13'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Loose dirt

0.0'-3.0' Cuttings 0.0'-1.5' (**SM/SC**) Clayey very fine sand (**10YR**) brown, grades to; 1.5'-3.0' (**SM/ML**) Silt-very fine sand mixture, no apparent hydrocarbon odor.

3.0'-5.0' Split Spoon 1.6' sample. 0.0'-1.6' (**SM/ML**) Silt-very fine sand mixture, light brown-tan with disseminated (Stage 2) CaCO₃ in top 0.5', slightly moist, no apparent hydrocarbon odor.

5.0'-7.0' Split Spoon 1.8' sample. 0.0'-0.7' (**SM/ML**) As above, localized (**SM**) intervals. 0.7'-1.8' (**SM**) Silty very fine sand grading to (**SP**) fine to medium sand at base, unconsolidated, slightly moist, no apparent hydrocarbon odor.

7.0'-9.0' Split Spoon 1.8' sample. 0.0'-0.1' Cave-in. 0.1'-1.4' (**SM**) Tan silty very fine sand, unconsolidated, moist. 1.4'-1.8' (**SW/GW**) Gravelly fine to coarse sand, ~15-20% gravel to 1.5" in center with less along margins, slightly moist, unconsolidated, no hydrocarbon odor.

9.0'-11.0' Split Spoon 1.9' sample. 0.0'-1.9' (**SP/GP**) Tan-brown fine to medium sand matrix surrounding ~10-20% rounded 1" gravel clasts, very moist at base, no apparent hydrocarbon odor, unconsolidated.

11.0'-13.0' Split Spoon 1.1' sample. 0.0'-1.1' (**SW**) Medium to coarse sand with ~≤5% pebbles and trace gravels, water saturated, no apparent hydrocarbon odor.



CLIENT: **BCEHD** Well/Borehole ID: **B-23**

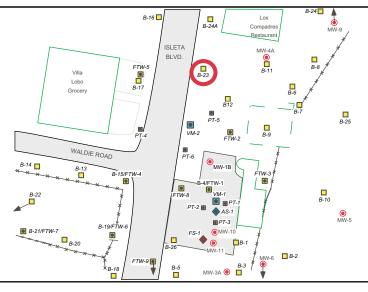
DATE OF DRILLING: 02-01-01
LOGGED BY: S. Grietens
DRILLER: Stan/Nevex

BOREHOLE DIAMETER: 7"

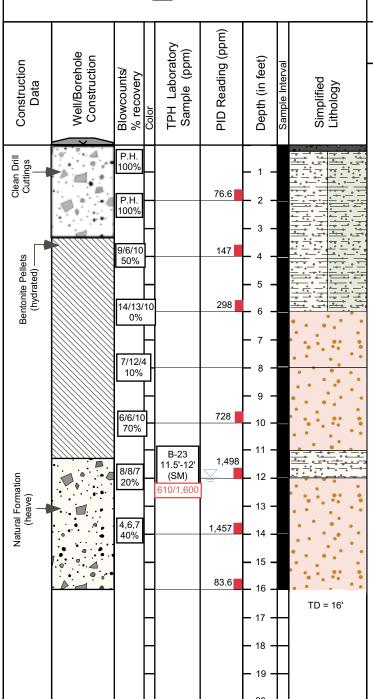
DRILLING METHOD: Hollow Stem Auger

SAMPLING METHOD: Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: ~12'
TOTAL DEPTH: 16'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt/road base 5-6"

<u>0.5'-2.0'</u> (SM/SC) (N3 - 10YR 3/3) 100% Silty/clayey sand, fine grain, traces of medium grain, firm, low plasticity, moist, strong odor.

2.0'-4.0' (Same as 0.5'-2.0' above) **100%**

4.0'-5.0' (Same as 0.5'-2.0' above) **50%**

6.0'-8.0' ? 0% Recovery. **(SP)**? Fine sand.

8.0'-10.0' (SW) (N3 - N5) 10% 0.0'-0.2 Very poor recovery, rock lodged in spoon mouth (SW). Fine to coarse sands with fines, fine to coarse gravel, strong odor, moist.

10.0'-12.0' (N3 - N5) **70**% 0.0'-1.0' (**SW**) Fine to coarse sands grading to (**SM**), moist to wet, odor. 1.0'-1.6' (**SM**) Fine silty sand, moist to wet, strong odor.

12.0'-14.0' (SW) (N3) **20%** Fine to coarse sands with fines, fine to medium gravel, wet, strong odor.

14.0'-16.0' (**SW**) (**10YR 5/3**) (**40%**) Same as 12.0'-14.0', color change.



CLIENT: **BCEHD**Well/Borehole ID: **B-24**

DATE OF DRILLING: 02-02-01 LOGGED BY: W. Brown

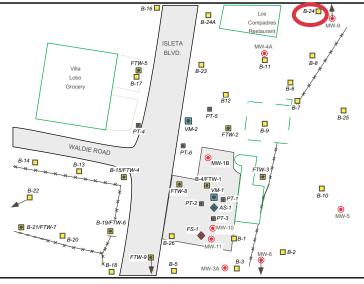
DRILLER: <u>H. Reichert/Rodgers</u>

BOREHOLE DIAMETER: 8"

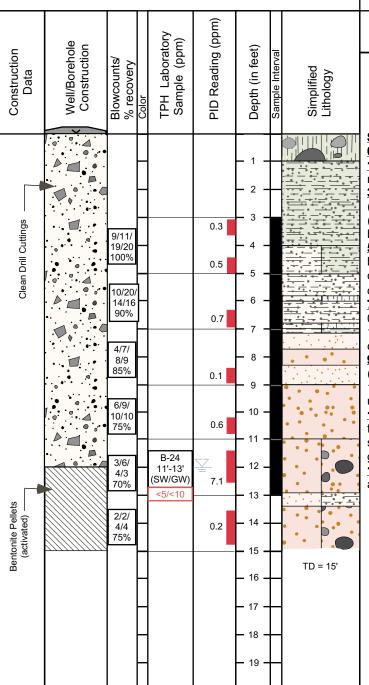
DRILLING METHOD: Hollow Stem Auger

SAMPLING METHOD: 3" Dia. Split Spoon/Posthole

TOP OF CASING ELEV: NA
DEPTH TO WATER: 12'
TOTAL DEPTH: 15'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Gravel **0.0'-1.0' Cuttings** (**GM**) Silty gravel.

1.0'-3.0' Cuttings (SC) Brown silty clayey very fine sand, moist, no apparent hydrocarbon odor.

3.0'-5.0' Split Spoon 2.0' sample. 0.0'-2.0' (SC) Dark brown (10YR) clayey very fine sand, dense, non plastic, grading to (SM/SC) clayey silty very fine sand, dense, no apparent hydrocarbon odor.

5.0'-7.0' Split Spoon 1.8' sample. 0.0'-1.7' (SM) Silty sand, brown (**10YR**) with localized siltier (SM/ML) intervals, weakly consolidated/cemented with CaCO₃, no apparent hydrocarbon odor. 1.7'-1.8' (SM/ML) Silty very fine sand, no hydrocarbon odor. **7.0'-9.0' Split Spoon** 1.7' sample. 0.0'-0.2' (SM/SC) As above. 0.2'-0.8' (SP) Tan well sorted sand, unconsolidated, no odor. 0.8'-1.3' (SW) Brown-tan, fine to coarse sand with≤ 10% gravel/pebble clasts, grades to; 1.3'-1.8' (SP) As above.

9.0'-11.0' Split Spoon 1.5' sample. 0.0'-0.1' Cave in. 0.1'-1.5' (**SW**) Fine to coarse sand with up to 10% pebbles and gravel to 1.5" across, moist, no apparent hydrocarbon odor, unconsolidated.

11.0'-13.0' Split Spoon 1.4' sample. 0.0'-1.2' (**SW/GW**) Gravelly fine to coarse sand, gray, no apparent hydrocarbon odor, water saturated, unconsolidated. 1.2'-1.4' (**SM/SP**) Silty very fine sand, gray, unconsolidated, no apparent hydrocarbon odor.

13.0'-15.0' Split Spoon 1.5' sample. 0.0'-0.3' (**SM/SP**) As above. 0.3'-1.5' (**GW/SW**) As above, no odor.



CLIENT: **BCEHD**Well/Borehole ID: **B-24A**

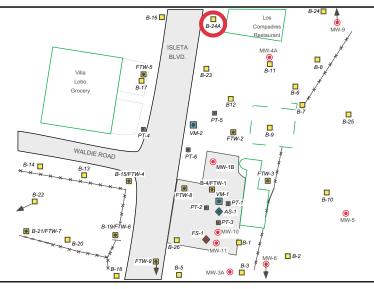
DATE OF DRILLING: 02-01-01
LOGGED BY: S. Grietens
DRILLER: Stan/Nevex

BOREHOLE DIAMETER: 7"

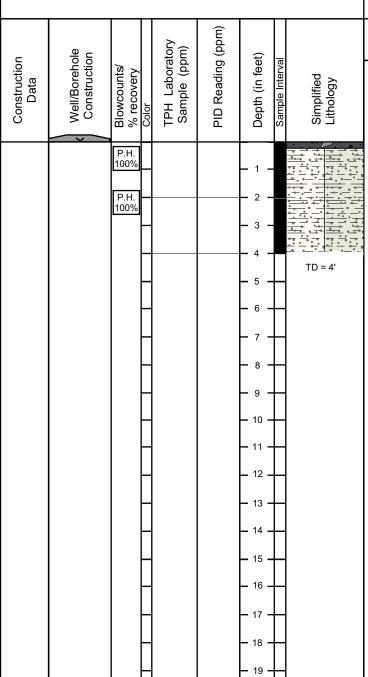
DRILLING METHOD: Hollow Stem Auger

SAMPLING METHOD: Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: NA
TOTAL DEPTH: 4'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt/road base 6" **0.0'-2.0'** (SM) (5YR 4/6) 100% Silty fine sand, some medium sand, soft, low to no plasticity, moist, no odor. **2.0'-4.0'** (SM/SC) (5YR 4/6) 100% Same as (0.5'-2.0') above, no odor.

Hit water line - Stopped drilling - contacted City of Albuquerque.



CLIENT: **BCEHD**Well/Borehole ID: **B-25**

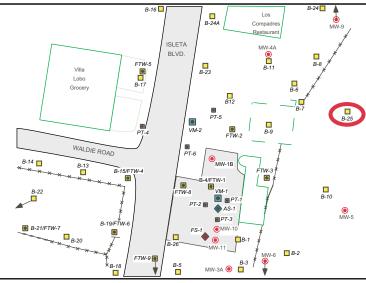
DATE OF DRILLING: 02-02-01 LOGGED BY: W. Brown

DRILLER: <u>H. Reichert/Rodgers</u>

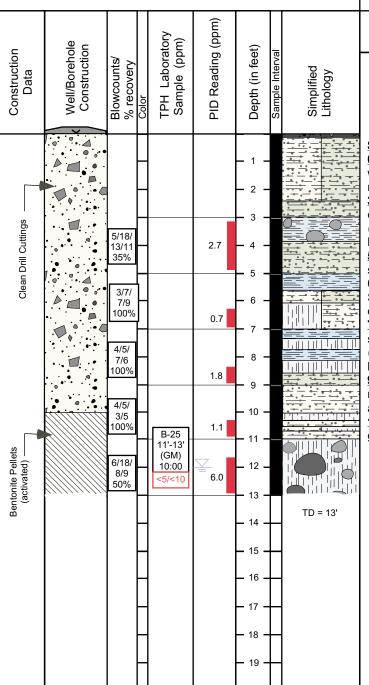
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger SAMPLING METHOD: 3" Dia. Split Spoon

TOP OF CASING ELEV: NA
DEPTH TO WATER: 12'
TOTAL DEPTH: 13'
CASING: NA
SCREEN: NA
SURFACE COMPLETION: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Loose dirt/gravel

0.0'-3.0' Cuttings 0.0'-2.5' (**SM/SC**) Clayey silty very fine sand with some gravel (**fill**). 2.5'-3.0' (**SC**) Brown clayey very fine sand, no hydrocarbon odor.

3.0'-5.0' Split Spoon 0.7' sample. 0.0'-0.4' (**GC**) Gravel and cobbles in clayey sand-clay matrix (**fill**). 0.4'-0.7' (**SC**) Brown (**10YR**) plastic clayey very fine sand, slightly moist, no hydrocarbon odor.

5.0'-7.0' Split Spoon 2.0' sample. Coarsening downwards sequence. 0.0'-0.6' (**CL**) Plastic (**10YR**) brown clay, grades to 0.6'-1.2' (**SM/SC**) Silty clayey very fine sand. 1.6'-2.0' (**ML/SM**) Silt-very fine sand mixture, soft, slightly moist, no hydrocarbon odor in core.

7.0'-9.0' Split Spoon 2.0' sample. Interbedded (**CL**) brown sandy clay, plastic; (**SC**) (**10YR**) clayey very fine sand, plastic; (**ML**) brown (**10YR**) brown clayey sandy silt, as shown on graphic log, moist, no apparent hydrocarbon odor.

9.0'-11.0' Split Spoon 2.0' sample. **(SM)** Brown silty sand with many thin interbeds of **(SM/SC)** and **(ML)**, very moist at base, no apparent hydrocarbon odor.

11.0'-13.0' Split Spoon 1.0' sample. 0.0'-1.0' (**GM**) Silty sandy gravel, water saturated, gray, no hydrocarbon odor.



CLIENT: **BCEHD**Well/Borehole ID: **B-26**

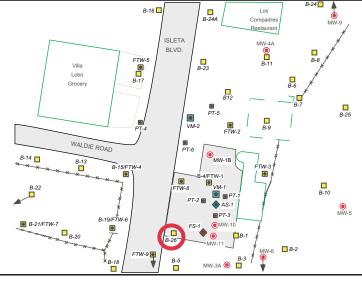
DATE OF DRILLING: 02-01-01
LOGGED BY: S. Grietens
DRILLER: Stan/Nevex

BOREHOLE DIAMETER: 7"

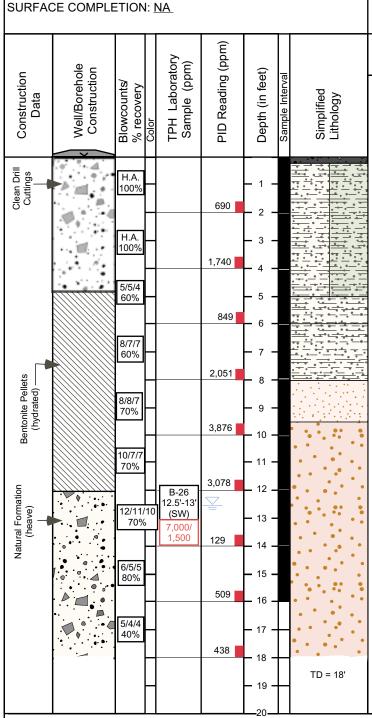
DRILLING METHOD: Hollow Stem Auger

SAMPLING METHOD: Split Spoon
TOP OF CASING ELEV: NA
DEPTH TO WATER: ~12.5'
TOTAL DEPTH: 18'

CASING: NA
SCREEN: NA



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt

0.0'-2.0' (SM/SC) (5YR 4/6) 100% Silty clayey fine to medium sand, firm, trace coarse sand, slightly moist, odor, color is mottled (5YR 4/6 - N5), no sharp contacts.

2.0'-4.0' (SM/SC) 100% Same as (0.0'-2.0') above.

4.0'-6.0' (N5) 60% 0.0'-0.6' (SM/SC) Mottled but grading in color to (N5), fine to medium sand, trace coarse sand, firm, odor. 0.6'-1.2' (SC) (N5) Clayey silty sand, fine sands, silts, no plasticity, slightly moist, firm/crumbly, smears, almost plastic, odor.

6.0'-8.0' (SM) (N7) 60% 0.0'-1.2' Fine silty sand, trace medium sand, soft, moist, no odor.

8.0'-10.0' (N7) 70% 0.0'-1.2' (SP) Well sorted fine sand with fines, soft, moist, odor. 1.2'-1.4' (SW) Grades quickly from (SP) ~1", fine to coarse sands, trace fine gravel, moist, odor.

10.0'-12.0' (SW) (N7) 70% Fine to coarse sand with fines, fine to medium gravel, soft, moist, odor.

12.0'-14.0' (SW) (N7) 70% Same as (10.0'-12.0') above, upper half is hydrocarbon saturated.

14.0'-16.0' (**SW**) (**N7**) **80%** Same as (10.0'-12.0') above **16.0'-18.0'** (**SW**) (**N7**) **40%** Same as (10.0'-12.0') above.



CLIENT: BCEHD

Well/Borehole ID: AS-1 Page 1 of 2

DATE OF DRILLING: 01-30-01 LOGGED BY: W. Brown

DRILLER: H. Reichert/Rodgers

BOREHOLE DIAMETER:

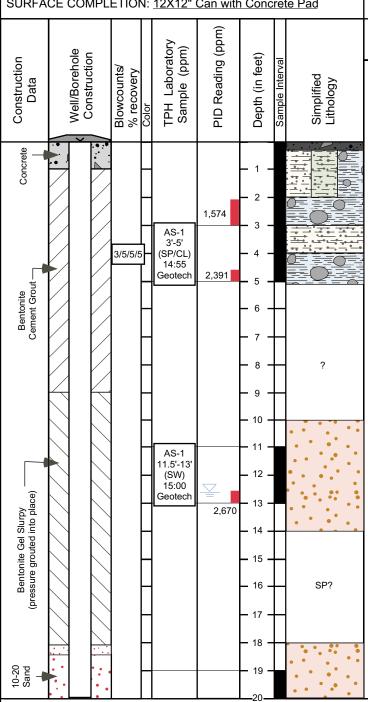
Hollow Stem Auger/Posthole **DRILLING METHOD:** SAMPLING METHOD: Continuous Split Spoon/Posthole

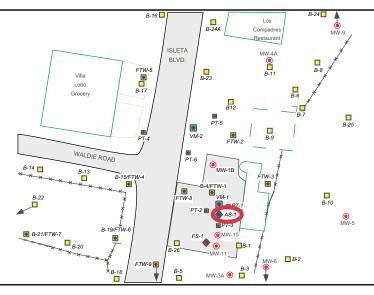
TOP OF CASING ELEV: NA **DEPTH TO WATER:** ~12.5'-13' 25' TOTAL DEPTH:

CASING: 0-20' - 2" Dia. Sched 40 PVC Blank 20'-25' - 2" Dia. 0.01 Slot Hi Flow SCREEN:

Sched 40 PVC

SURFACE COMPLETION: 12X12" Can with Concrete Pad





USCS - LITHOLOGIC DESCRIPTION

Surface Conditions: Asphalt

0.0'-0.2' Asphalt.

0.2'-2.0' (SM/SC/GC) Fill sediments consisting of silty clayey sand matrix with up to 25-30%≤1" gravel clasts, reddish-brown (7.5YR) grades to;

2.0'-3.0' (GC) Clayey gravel to clayey (SC) sand, gray-brown, slightly moist, moderately degraded, hydrocarbon odor.

3.0'-5.0' (**Geotech Spoon Sample**) 0.8' sample. 0.0'-0.5' (**SP**) Tan-brown (10YR) medium sand, unconsolidated, slightly moist. 0.5'-0.8' (CL/GC) Silty sandy clay surrounding 2" gravel clast, plastic, weak to moderate hydrocarbon odor.

11.0'-13.0' (Geotech Spoon Sample) 1.3' sample. 0.0'-1.3' (SW) Gray to brown-gray, fine to coarse sand with≤ 10%-15% pebble and gravel clasts ≤3/4" across, moist, unconsolidated, strong hydrocarbon odor.

19.0'-21.0' (Geotech Spoon Sample) 0.2' Recovery. (SW) Medium to coarse sand with minor gravel and pebbles.



CLIENT: BCEHD

Well/Borehole ID: **AS-1** Page 2 of 2

DATE OF DRILLING: 01-30-01 LOGGED BY: W. Brown

DRILLER: <u>H. Reichert/Rodgers</u>

BOREHOLE DIAMETER: 8"

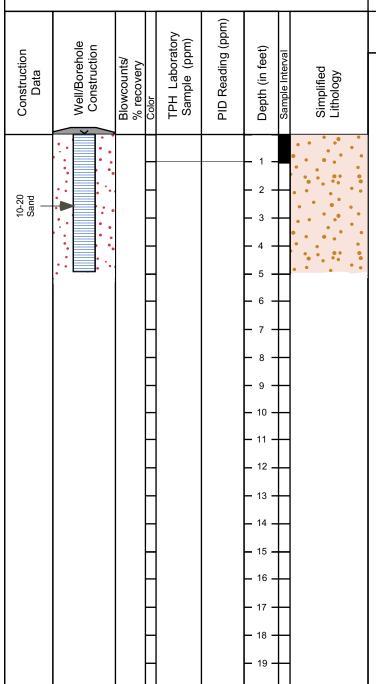
DRILLING METHOD: Hollow Stem Auger/Posthole
SAMPLING METHOD: Continuous Split Spoon/Posthole

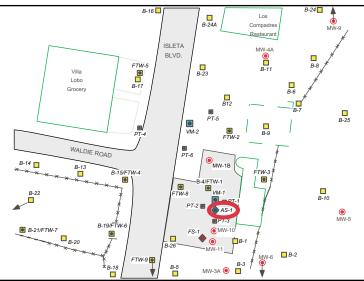
TOP OF CASING ELEV: NA
DEPTH TO WATER: ~12.5'-13'
TOTAL DEPTH: 25'

CASING: 0-20' - 2" Dia. Sched 40 PVC Blank SCREEN: 20'-25' - 2" Dia. 0.01 Slot Hi Flow

Sched 40 PVC

SURFACE COMPLETION: 12X12" Can with Concrete Pad





USCS - LITHOLOGIC DESCRIPTION



CLIENT: **BCEHD** Well/Borehole ID: VM-1

DATE OF DRILLING: 11-28-00 & 01-30-01

LOGGED BY: W. Brown

DRILLER: H. Reichert/Rodgers

BOREHOLE DIAMETER: 8"/12"

DRILLING METHOD: Hollow Stem Auger

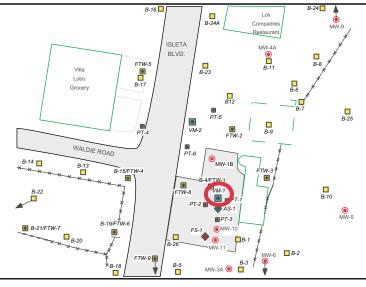
SAMPLING METHOD: Split Spoon TOP OF CASING ELEV: Not Available

DEPTH TO WATER: ~13" TOTAL DEPTH: 19'

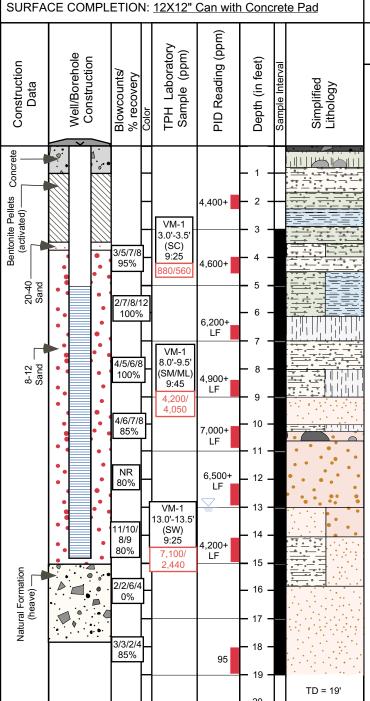
CASING: 0-5' - 4" Dia. Sched 40 PVC Blank SCREEN: 5'-15' - 4" Dia. 0.01 Wire Wrapped

Hi Flow Slot Sched 40 PVC.

SURFACE COMPLETION: 12X12" Can with Concrete Pad



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt

0.0'-0.2' Asphalt.

0.2'-0.5' (GM) Silty sandy gravel (fill).

0.5'-1.5' (SM) Brown (10YR) silty very fine sand, unconsolidated, moist, weak hydrocarbon odor.

1.5'-3.0' (SC) Dark gray (N3) Clayey very fine sand grading to (CL) plastic dark gray (N3) sandy silty clay, medium soft with moderate to strong hydrocarbon odor.

3.0'-5.0' Split Spoon 1.9' sample. 0.0'-0.9' (SC) Brown-gray, plastic, moderate hydrocarbon odor, grading to (SM/SC) silty clayey very fine sand at base. 0.9'-1.5' (SM) Light gray (N6) silty very fine to fine sand, moderate hydrocarbon odor, degraded. 1.5'-1.9' (SC/CL) Olive-gray clay, very fine sand, weakly plastic, moist, moderate hydrocarbon odor.

5.0'-7.0' Split Spoon 2.0' sample. 0.0'-0.3' (**SM/SC**) As above. (cave-in?). 0.3'-1.2' (SC/CL) As above, dark gray-olive, plastic, moist, moderate to strong hydrocarbon odor. 1.2'-2.0' (ML) Clayey sandy silt, soft, very strong hydrocarbon gas odor, moist.

7.0'-9.0' Split Spoon 2.0' sample. 0.0'-2.0' (SM) Light gray silty very fine sand grading to (SM/ML) very fine sand silt mixture in lower 1/2', strong hydrocarbon gas odor, moist, unconsolidated.

9.0'-11.0' Split Spoon 1.7' sample. 0.0'-1.0' (SP) Tan-light gray, medium to fine sand, unconsolidated, strong hydrocarbon odor. 1.0'-1.2' (SM/ML) As above, dark gray (N3). 1.2'-1.4' (GW) Fine sandy gravel, up to 3/4" clasts with fine to medium sand. 1.4'-1.5' (SM) Silty fine sand. 1.5'-1.7' (SW) Fine to coarse sand with trace gravel, moist, strong hydrocarbon odor.

11.0'-13.0' Split Spoon 1.6' sample. 0.0'-1.6' (SW) As above, mostly medium to coarse sand, strong hydrocarbon odor.

13.0'-15.0' Split Spoon 1.6' sample. 0.0'-1.1' (SP/SW) Medium sand with minor fine coarse sand and gravel. 1.1'-1.6' (SM/SP) Gray fine sand with trace silt, entire core is water saturated, upper 1/2 is hydrocarbon saturated also.

15.0'-17.0' No recovery. (SP?) or (SM/SP?)

17.0'-19.0' Split Spoon 1.7' sample. 0.0'-1.7' (SP) Light gray brown, weak hydrocarbon odor, unconsolidated, medium to fine sand.



CLIENT: **BCEHD**Well/Borehole ID: **VM-2**

DATE OF DRILLING: 02-21-01
LOGGED BY: S. Grietens
DRILLER: Stan/Nevex

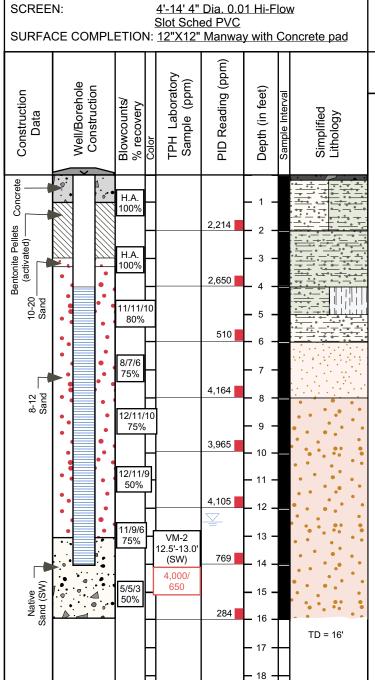
BOREHOLE DIAMETER: 7"

DRILLING METHOD: Hollow Stem Auger

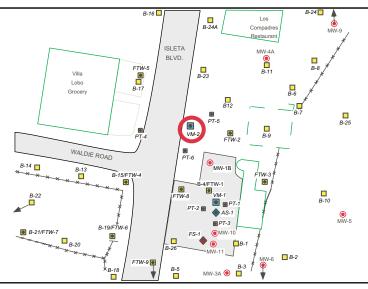
SAMPLING METHOD: Split Spoon TOP OF CASING ELEV: Not Available

DEPTH TO WATER: 12.5"
TOTAL DEPTH: 16'

CASING: 0-4' Sched 40 PVC
SCREEN: 4'-14' 4" Dia. 0.01 Hi-Flow



19



USCS - LITHOLOGIC DESCRIPTION

Surface Conditions: Asphalt

0.0'-2.0' Split Spoon 2.0' sample. (5YR 4/6) (N3)

0.0'-1.0' (SM/SC) (5YR 4/6) Fine silty/clayey sand, slightly moist, some gravel/road base at surface, trace of gravel-cobbles, slight odor, soft. 1.0'-2.0' (SM/SC) (N5) Well defined color at 1.0 to (N5), strong odor, still fine clayey silty sand, slightly moist.

2.0'-4.0' Split Spoon 2.0' sample. (SC/SM) (N5) Clayey very fine sand/silt, soft, slightly moist, strong odor, soft to firm.

4.0'-6.0' Split Spoon 1.6' sample. (**10YR 3/3 - 5Y 4/1**) 0.0'-1.0' (**SC**) (**10YR 3/3**) Clayey fine sand/silt, strong odor, slightly moist soft to firm, color changes to (**5Y 4/1**) at 0.8' grading to fine silty sandy clay almost (**ML**), low plasticity, carbonate present, coarse sand size, firm. 1.0'-1.8' (**SM**) Sharp contact from (**SC**) very fine grain sand/silt, soft, slightly moist, odor.

6.0'-8.0' Split Spoon 1.5' sample. (**SP**) (**10YR 5/3**) 0.0'-1.5' Very fine well sorted sand with some fines, soft, slightly moist, odor. **8.0'-10.0' Split Spoon** 1.5' sample. (**SW**) (**5YR 4/6**) Fine to coarse sand with some fine to coarse gravel, slightly moist, soft, some fines, odor.

10.0'-12.0' Split Spoon 1.0' sample. **(SW) (N5)** Same as (8.0'-10.0') above, odor stronger.

12.0'-14.0' Split Spoon 1.5' sample. **(SW) (N5)** Same as (8.0'-10.0') above, wet, strong odor.

14.0'-16.0' Split Spoon 1.0' sample. (SW) (N5)



CLIENT: BCEHD

Well/Borehole ID: FTW-2

DATE OF DRILLING: 10-12-00 LOGGED BY: W. Brown

DRILLER: <u>H. Reichert/Rodgers</u>

BOREHOLE DIAMETER: 8"

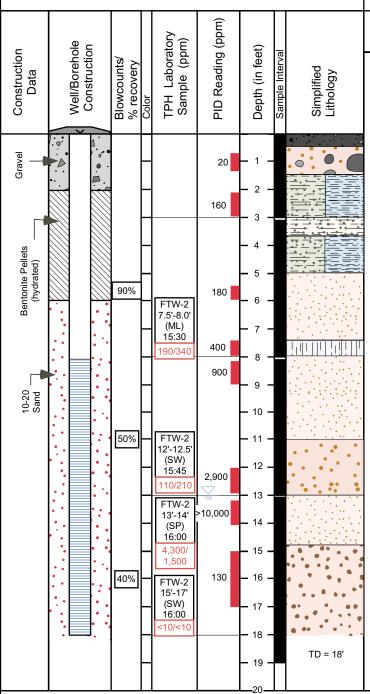
DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 3" Dia. 5' Long Split Spoon

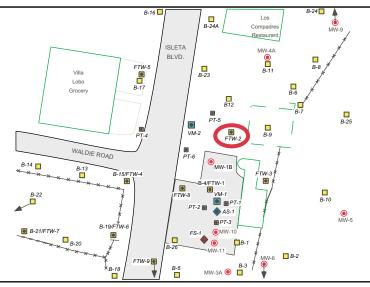
TOP OF CASING ELEV: NA DEPTH TO WATER: 13"
TOTAL DEPTH: 18'

CASING: <u>0-8' 2" Dia. Sched 40 PVC</u>

SCREEN: 8'-18' 0.01 Slot 2" Dia. Sched 40 PVC

SURFACE COMPLETION: 12X12" Can with Concrete Pad





USCS - LITHOLOGIC DESCRIPTION

Surface Conditions: Gravel

0.0'-1.5' Hand Auger (**GW**) Sandy gravel, gray (**N5**), slightly moist, strong hydrocarbon odor.

1.5'-3.0' hand Auger (SC/CL) (10YR) Dark brown, low plasticity, sandy silty clay, moist, slight hydrocarbon odor.

3.0'-8.0' Split Spoon 4.5' sample. 0.0'-0.6' (**SM**) Silty sand (**10YR**) dark brown, moist, moderate hydrocarbon odor. 0.6'-1.9' (**SC/CL**) (**10YR**) Dark brown, sandy silty clay, moist at base 2mm to 5mm nodules, CaCO₃ present. 1.9'-4.0' (**SP**) (**10YR**) Brown, moist, fine sand, moderate hydrocarbon odor. 4.0'-4.5' (**ML**) Clayey silt, soft, non plastic to weakly plastic (**10YR**) brown, hydrocarbon odor increases towards base.

8.0'-13.0' Split Spoon 2.5' sample. 0.0'-1.5' (**SP**) (**N5**) Gray fine grained sand, moderate hydrocarbon odor 3"-4" slides throughout core. 1.5'-2.5' (**SW**) Gray (**N5**) Gravelly sand, moist, strong hydrocarbon odor.

13.0'-18.0' Split Spoon 2.0' sample. 0.0'-1.0' (**SP**) Fine grained sand, gray (**N5**) hydrocarbon saturated, water saturated. 1.0'-2.0' (**SW**) Gray (**N5**) strong to moderate hydrocarbon odor, sandy gravel, moist.



CLIENT: BCEHD

Well/Borehole ID: FTW-3

DATE OF DRILLING: 10-13-00 LOGGED BY: T. Chavez

DRILLER: <u>H. Reichert/Rodgers</u>

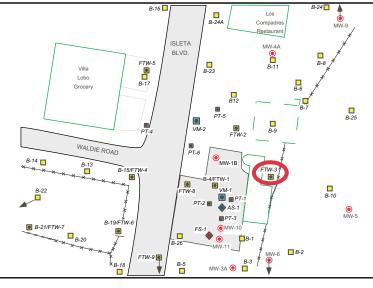
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: 3" Dia. 5' Long Split Spoon

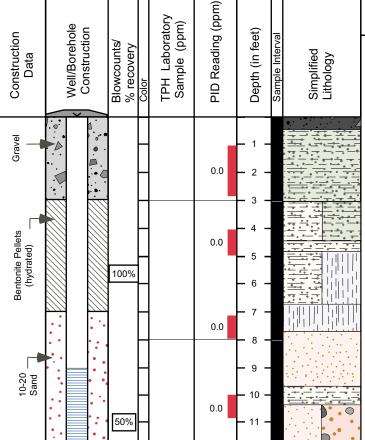
TOP OF CASING ELEV: NA DEPTH TO WATER: 13' TOTAL DEPTH: 19'

CASING: <u>0-9' 2" Dia. Sched 40 PVC Blank</u> SCREEN: <u>9'-19' 0.01 Slot 2" Dia. Sched 40 PVC</u>

SURFACE COMPLETION: 8X12" Can with Concrete Pad



USCS - LITHOLOGIC DESCRIPTION



180

1,500

100

TD = 19'

FTW-3 14'-15'

(SW) 11:45 270/230 Surface Conditions: Gravel

 $\underline{\textbf{0.0'-3.0'}}$ (SC) Clayey sand (10YR) dark brown, moist, some gravel, no hydrocarbon odor.

3.0'-8.0' Split Spoon 5.0' sample. 0.0'-1.4' (**SM/SC**) Silty clayey sand (**10YR**) dark brown, slightly moist, root system throughout, grading to; 1.4'-1.8' (**SM**) (**10YR**) Dark brown silty sand, slightly moist, no hydrocarbon odor. 1.8'-3.8' (**SM/ML**) Silty fine sand, slightly moist, no hydrocarbon odor (**10YR**) brown. 3.8'-4.8' (**ML**) Sandy silt, slightly moist, (**10YR**) tan. 4.8'-5.0' (**SP**) Fine sand, some gravel, (**10YR**) tan-brown, slightly moist to moist, no hydrocarbon odor.

8.0'-13.0' Split Spoon 2.5' sample. 0.0'-1.8' (**SP**) (**10YR**) Tan to light brown fine grained sand, some gravel, no hydrocarbon odor, moist. 1.8'-2.1' (**SM**) Silty sand, moist (**10YR**) light brown, no hydrocarbon odor. 2.1'-2.5' (**SP/GW**) Gravel-sand (**N7**) light gray, no apparent hydrocarbon odor, unconsolidated.

13.0'-19.0' Split Spoon 2.3' sample. 0.0'-0.8' (**SP**) Fine sand, well sorted (**N5**) gray, near hydrocarbon saturated, water saturated, strong hydrocarbon odor-diesel smell. 0.8'-2.1' (**SW**) Gravelly sand, coarse grained (**N5**) gray, strong hydrocarbon (diesel) odor. 2.1'-2.3' (**SP**) (**N7**) Light gray moist, water saturated, fine sand.



40%

CLIENT: BCEHD

DATE OF DRILLING: 02-05-01
LOGGED BY: S. Grietens
DRILLER: Stan/Nevex

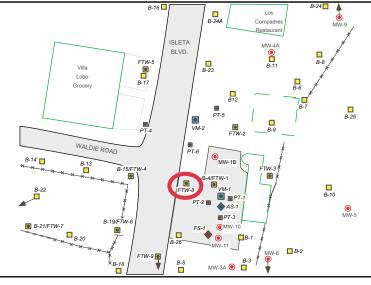
Well/Borehole ID: FTW-8

BOREHOLE DIAMETER: 7"

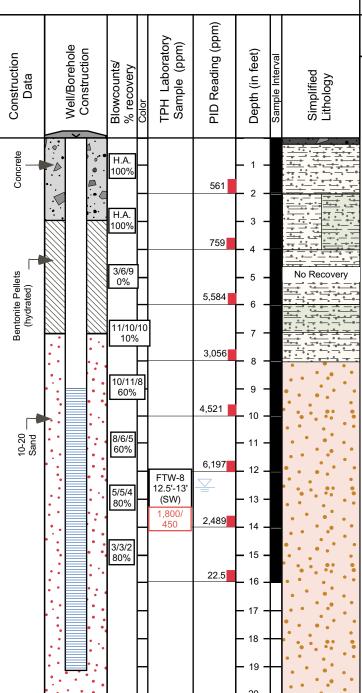
DRILLING METHOD: Hollow Stem Auger

SAMPLING METHOD: Split Spoon
TOP OF CASING ELEV: NA
DEPTH TO WATER: ~12.5'
TOTAL DEPTH: 20'

CASING: 0-9' 2" Dia. Sched 40 PVC Blank
SCREEN: 9'-19' 2" Dia. .01 Slot Sched 40 PVC
SURFACE COMPLETION: 8"X12" Can with Concrete Pad



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt

0.0'- 0.3' Road base.

0.3'-2.0' Fine to medium silty sands, <% fine gravel, strong odor, slightly moist, soft.

2.0'-4.0' (SM/SC) (N3) 100% Fine to medium silty clayey sands <1% fine gravel, low plasticity at times - no plasticity, soft, moist, strong odor, no sharp contacts

4.0'-6.0' No recovery.

6.0'-8.0' (SM) (N5) 10% Fine silty sand, soft, slightly moist, strong odor.

Second Hole 4.0'-6.0' (SM) (N5) 80% Fine to medium silty sands, ~5% coarse sand/fine gravel, slightly moist to moist, strong odor, soft.

Third Hole 6.0'-8.0' (SM) (N5) 90% 0.0'-1.0' (SC) Clayey silty fine sand, trace medium to coarse sand, firm, low plasticity to no plasticity, slightly moist, strong odor. 1.0'-1.8' (SM) Fine silty sand, soft, moist, strong odor, sharp contact.

8.0'-10.0' 80% (**SW**) (**N5**) 60% Fine to coarse sand with fines, trace fine gravel, slightly moist, soft, strong odor.

10.0'-12.0' (SW) (N5) 60% Same as (8.0'-10.0') above.

12.0'-14.0' (SW) (N5) Same as (8.0'-10.0') above with some fine to coarse gravel.

14.0'-16.0' (**SW**) (**N5**) Same as (12.0'-14.0') above, slight odor.



TD = 20'

CLIENT: BCEHD

Well/Borehole ID: FTW-9

DATE OF DRILLING: 02-05-01
LOGGED BY: S. Grietens
DRILLER: Stan/Nevex

BOREHOLE DIAMETER: 7"

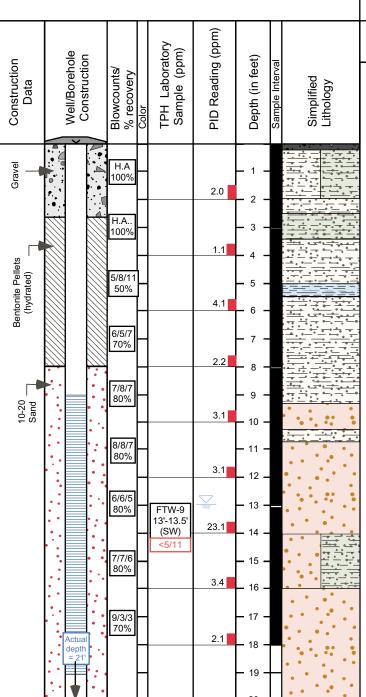
DRILLING METHOD: Hollow Stem Auger

SAMPLING METHOD: Split Spoon
TOP OF CASING ELEV: NA
DEPTH TO WATER: ~13'
TOTAL DEPTH: 21'

CASING: 0-9' 2" Dia. Sched 40 PVC Blank
SCREEN: 9'-19' 2" Dia. .01 Slot Sched 40 PVC
SURFACE COMPLETION: 8"X12" Can with Concrete Pad



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt

0.0'-2.0' (SM/SC) (5YR 4/6) 100% Clayey silty fine to medium sand, slightly moist, no odor, no sharp contacts.

2.0'-4.0' (5YR 4/6) 100% 0.0'-0.5' (SM) Same as (0.0'-2.0') above. 0.5'-1.5' (SC) (10YR 3/3) Silty clayey very fine sand, low plasticity, soft, slightly moist, no odor. 1.5'-2.0' Same as (0.0'-2.0') above.

4.0'-6.0' 50% 0.0'-0.75' (**CL**) Silty clay, firm, low plasticity, slightly moist, no odor, sharp contact at (**SM**) 0.75'-1.0' (**SM**) (**10YR 6/8**) Very fine sand with fines, trace medium sand, dry, no odor.

6.0'-8.0' (SM) (10 YR 6/8) 70% Very fine silty sand, very firm, dry, no odor.

8.0'-10.0' 80% 0.0'-1.0' Same as (6.0'-8.0') above grading to (**SW**) at 1.0'. 1.0'-1.6' (**SW**) Fine to coarse sands with fines, slightly moist, ~1-2% fine to medium gravel, no odor.

10.0'-12.0' 80% 0.0'-0.3' (**SW**) Same as (8.0-10.0'(1.0'-1.6')) above. 0.3'-0.5' (**SM**) Silty fine grained sand, soft. 0.5'-1.6' (**SW**) Same as (8.0'-10.0'(1.0'-1.6')) above, no odor.

12.0'-14.0' 80% 0.0'-0.8' (**SW**) (**10YR 6/8**) Same as (8.0'-10.0(1.0'-1.6')) above. 0.8'-1.6' (**SW**) (**N5**) Same as (8.0'-10.0'(1.0'-1.6')) above.

14.0'-16.0' 80% (**SW**) Fine to coarse sands with fines, fine to medium gravel, trace coarse gravel, wet, odor. (**SC**) Appears as coarse gravel sized nodules, fine to medium clayey sands (**N5**) <5%.

16.0'-18.0' (**SW**) (**5Y 4/1**) **70%** Fine to coarse grained sands with fines, fine to medium gravel, trace gravel/coarse, wet, no odor.



TECUMSEH PROFESSIONAL ASSOCIATES, INC.

TD = 21'

CLIENT: **BCEHD** Well/Borehole ID: **PT-1**

DATE OF DRILLING: 01-29-01 LOGGED BY: W. Brown

DRILLER: <u>H. Reichert/Rodgers</u>

BOREHOLE DIAMETER: 8"/12"

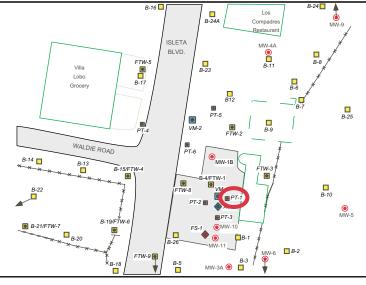
DRILLING METHOD: Hollow Stem Auger/Posthole

SAMPLING METHOD: Split Spoon/Posthole

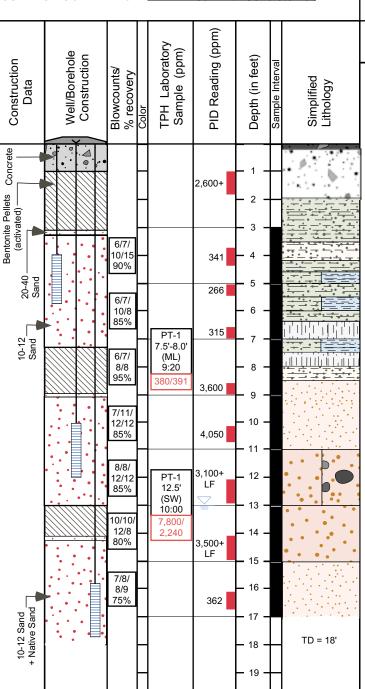
TOP OF CASING ELEV: NA
DEPTH TO WATER: ~12.5'
TOTAL DEPTH: 18'

CASING: <u>Various lengths 1" Dia. Sched 80 PVC</u> SCREEN: 2'-5' Long 0.01 Slot Sched 80 PVC X3

SURFACE COMPLETION: 12"X12" Can with Concrete Pad



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt

0.0'-0.2' Asphalt.

0.2'-2.0' (**FiII**) Dark gray to black (**SC**) clayey sand, (**ML**) silt, and (**GC**) clayey gravel, slightly moist, moderate to strong hydrocarbon odor, degraded (posthole).

2.0'-3.0' (SC) Fill clayey very fine sand, plastic, moderate hydrocarbon odor.

3.0'-5.0' Split Spoon 1.8' sample. 0.0'-0.5' (**SC**) Dark browngray, silty clayey sand, slightly plastic, moist, grades to; 0.5'-1.1' (**SM**) Brown-olive, silty very fine to fine grained sand, weak hydrocarbon odor. 1.1'-1.8' (**SC**) Silty clayey very fine sand grading to (**SC/CL**) clayey very fine sand to sandy clay at base, plastic at base, moderate hydrocarbon odor at base, slightly moist. **5.0'-7.0' Split Spoon** 1.7' sample. 0.0'-1.3' (**SC**) Clayey sand to

(CL) sandy clay, plastic, moist, grades to; 1.3'-1.7' (ML) Clayey silty, non plastic, soft, moderate to weak hydrocarbon odor. **7.0'-9.0' Split Spoon** 1.9' sample. 0.0'-0.3' (SC/CL) As above, plastic. 0.3'-1.9' Coarsening downwards sequence. 0.3'-0.9' (ML) tan, silt with strong hydrocarbon gas odor. 0.9'-1.4' (SM) Silty very fine sand, dark brown to black at base, strong hydrocarbon odor.

1.4'-1.5' 1" gravel clast. 1.5'-1.9' (SP) Tan-gray medium sand

with strong gas odor.

9.0'-11.0' Split Spoon 1.6' sample. 0.0'-0.2' Cave-in. 0.2'-1.6' (**SP**) Fine to medium sand, gray (**N5**) with minor silt and gravel (**SW**) zone at base, moist, very strong hydrocarbon gas odor. **11.0'-13.0' Split Spoon** 1.7' sample. 0.0'-1.7' (**SW/GW**) Medium to coarse sand with up to 15-20% gravel clasts to 2" across, water saturated, very strong hydrocarbon odor.

13.0'-15.0' Split Spoon 1.6' sample. 0.0'-1.6' (**SW**) As above, mostly medium to coarse sand, strong hydrocarbon odor. **15.0'-17.0' Split Spoon** 1.6' sample. 0.0'-1.6' (**SW**) Dark gray to gray (**N3-N5**), fine to coarse sand with ~5-10% pebbles and gravel, water saturated, very strong hydrocarbon odor.

17.0'-19.0' Split Spoon 1.5' sample. 0.0'-1.5' (**SP**) Tan gray fine to medium sand with ~5% pebbles and gravel, water saturated, moderate to weak hydrocarbon odor.



CLIENT: **BCEHD**Well/Borehole ID: **PT-2**

DATE OF DRILLING: 01-29-01 LOGGED BY: W. Brown

DRILLER: H. Reichert/Rodgers

BOREHOLE DIAMETER: 8"/12"

DRILLING METHOD: Hollow Stem Auger/Posthole

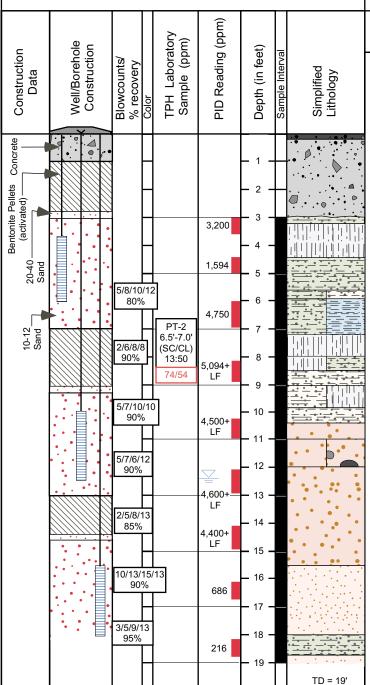
SAMPLING METHOD: Split Spoon/Posthole

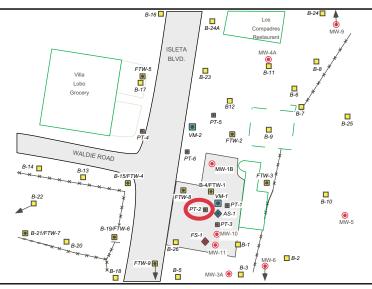
TOP OF CASING ELEV: NA

DEPTH TO WATER: ~12.5'-13.0'

TOTAL DEPTH: 19'

CASING: Various lengths 1" Dia. Sched 80 PVC SCREEN: 2.5' Long 1" Dia. Sched 80 PVC (X3) SURFACE COMPLETION: 12"X12" Manway with Conrete Pad





USCS - LITHOLOGIC DESCRIPTION

Surface Conditions: Asphalt

0.0'-3.0' Posthole (Fill) Mixture of (SC) clayey very fine sand, (GC) gravelly clay and (SM/SC) silty clayey very fine sand, mostly (SM/SC) moderate to strong hydrocarbon odor (posthole).

3.0'-5.0' Split Spoon 1.8' sample. 0.0'-0.3' (**SC**) Dark brown silty clayey very fine sand, non plastic, moderate hydrocarbon odor, grades to; 0.3'-1.5' (**ML**) Silt with some clay, non plastic, slightly moist, grades to; 1.5'-1.8' (**SC**) Brown (**10YR**) as above, moderate to strong hydrocarbon torpene odor in lower 2/3.

5.0'-7.0' Split Spoon 1.6' sample. 0.0'-0.4' (**SC**) Brown red, non plastic, clayey very fine to fine sand with infilled dessicated structures. 0.4'-0.6' (**SM/SC**) Clayey silty very fine sand, tan-brown grades to; 0.6'-1.6' (**SC/CL**) Clay-sand mixtures, plastic, medium dense, slightly moist, moderately degraded hydrocarbon odor. **7.0'-9.0' Split Spoon** 1.8' sample. 0.0'-0.2' (**SC/CL**) As above 0.2'-1.5' (**ML**) grading to (**ML/SC**) in basal portion, silt, very moist, grading to clayey silt, moist, weakly plastic with depth, strong hydrocarbon odor. 1.5'-1.8' (**SM**) Brown-gray silty very fine sand, slightly moist, strong hydrocarbon odor.

9.0'-11.0' Split Spoon 1.8' sample. 0.0'-0.1' Cave-in. 0.1'-0.9' (**SM/ML**) Silt-very fine sand mixture, gray-brown. 0.9'-1.4' (**SM**) Gray-tan silty very fine sand, moist. 1.4'-1.8' (**SW**) Gray (**N6**) Fine to coarse sand with ~10-20% pebbles and gravel, strong hydrocarbon odor throughout.

11.0'-13.0' Split Spoon 1.7' sample. 0.0'-1.0' (**SW/GW**) Fine to coarse sand (mostly medium), with $20\% \le 1$ " gravel clasts, very moist, near hydrocarbon saturated, gray (**N5**) strong hydrocarbon odor. 1.0'-1.8' (**SW**) As above but with ≤ 5% gravel.

13.0'-15.0' Split Spoon 1.7' sample. 0.0'-1.7' (**SW**) Dark gray to gray (**N4-N5**) fine to medium sand with ~10-15% pebbles and gravel to 1" across, hydrocarbon and water saturated, very strong odor.

15.0'-17.0' Split Spoon 1.8' sample. 0.0'-0.3' (**SW**) As above. 0.3'-1.8' (**SP**) Gray (**N6**) fine to medium sand, unconsolidated, water saturated with very strong hydrocarbon gas odor,≤ 5% pebble and gravel clasts.

17.0'-19.0' Split Spoon 1.9' sample. 0.0'-1.1' (**SP**) Medium grained sand, unconsolidated, light gray, strong hydrocarbon odor. 1.1'-1.6' (**SC**) Clayey sand, plastic, interbedded with (**SP**) as above. 1.6'-1.8' (**SP**) As above, moderate hydrocarbon odor.



CLIENT: **BCEHD** Well/Borehole ID: PT-3

DATE OF DRILLING: 01-29-01 LOGGED BY: W. Brown

DRILLER: H. Reichert/Rodgers

BOREHOLE DIAMETER: 8"/12"

DRILLING METHOD: Hollow Stem Auger/Posthole

Split Spoon/Posthole SAMPLING METHOD:

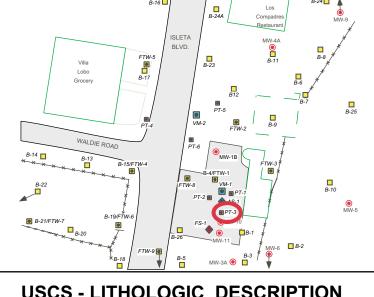
TOP OF CASING ELEV: NA

DEPTH TO WATER: ~12.5'-13.0'

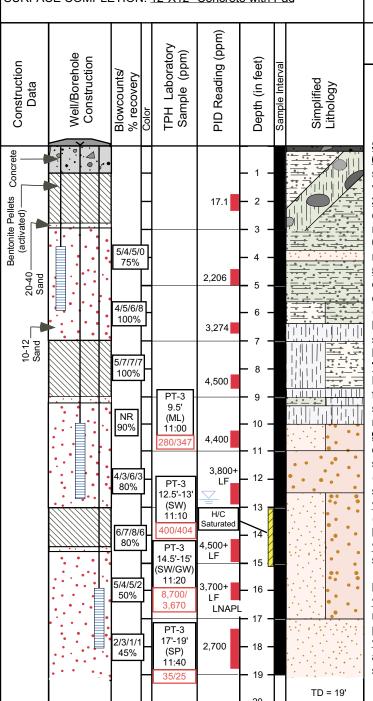
TOTAL DEPTH: 19'

CASING: Various lengths 1" Dia. Sched 80 PVC 2.5' Long 1" Dia. Sched 80 PVC (X3) SCREEN:

SURFACE COMPLETION: 12"X12" Concrete with Pad



USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt

0.2'-3.0' Posthole Fill material - mixture of (SM) silty very fine sand, tan-brown, (GM) gravelly silty sand and (SC) clayey silty very fine sand, brown (10YR), no hydrocarbon odor._

3.0'-5.0' Split Spoon 1.5' sample. 0.0'-0.4' (**SC**) Dark brown clayey very fine sand with ~5% gravel clasts, plastic, slightly moist. 0.4'-0.7' (SP) Tan-brown sand, fine to medium grained. 0.7'-1.5' (SC) Brown (10YR) silty clayey very fine sand, plastic, moderate-sweet hydrocarbon odor at base, slightly moist.

5.0'-7.0' Split Spoon 2.0' sample. 0.0'-0.5' (**SC**) With small gravel clasts (fill?) with PVC chunk (part of old remediation system?)* clayey very fine sand, moderate hydrocarbon odor. 0.5'-1.4' (SM/SC) Tan-olive-yellow silty clayey very fine sand, locally slightly plastic, slightly moist, grades to; 1.4'-2.0' (ML) Clayey silt, slightly plastic, and moist, tan-gray, moderate to strong hydrocarbon odor.

7.0'-9.0' Split Spoon 2.0' sample. 0.0'-0.2' (SC?) Fill/cave-in? Brown clayey sand. 0.2'-1.7' (ML/SM) Light brown-tan silty very fine sand mixture, soft, moderate to strong hydrocarbon gas odor, slightly moist grades to; 1.7'-2.0' (ML) Brown (10YR) clayey silt, non plastic, moist, strong odor.

9.0'-11.0' Split Spoon 1.8' sample. 0.0'-0.3' (**SC/ML**) Brown clay-silt-very fine sand mixture grades to; 0.3'-0.8' (ML) Sandy silt, slightly moist, strong hydrocarbon odor, grades to; 0.8'-1.8' (SP/SW) Tan-brown fine to coarse sand-mostly medium, very strong hydrocarbon odor.

11.0'-13.0' Split Spoon 1.6' sample. 0.0'-0.1' Cave-in. 0.1'-1.6' (SW) Gravelly sand grading to medium grained (SW/SP) sand at base, very strong hydrocarbon odor, near hydrocarbon saturated. **13.0'-15.0' Split Spoon** 1.6' sample. 0.0'-1.6' (SW/GW) Poorly sorted fine to coarse sand with ~10-20% gravel clasts, rounded, to 1.5" across, hydrocarbon saturated, water saturated, very strong hydrocarbon gas-diesel odor.

15.0'-17.0' Split Spoon 1.0' sample. 0.0'-1.0' (SP/SM) Fine to medium sand, water saturated, light gray (N5) with minor silt and pebbles, moderate to strong hydrocarbon odor.

17.0'-19.0' Split Spoon 0.9' sample. 0.0'-0.9' (SP) Same as above but without silt, moderate to weak hydrocarbon odor, water saturated.



CLIENT: **BCEHD**Well/Borehole ID: **PT-4**

 DATE OF DRILLING:
 01-30-01

 LOGGED BY:
 S. Grietens

 DRILLER:
 Stan/Nevex

BOREHOLE DIAMETER: 7"

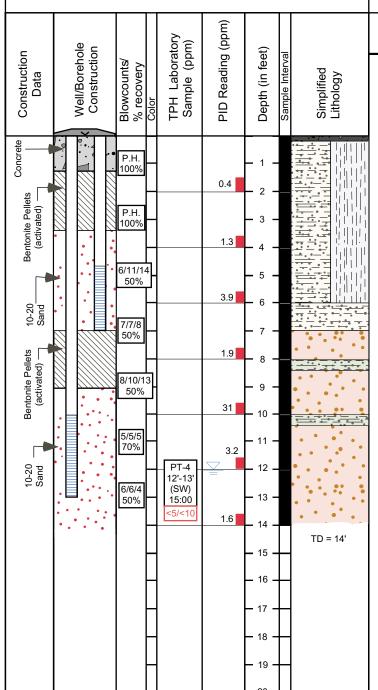
DRILLING METHOD: Hollow Stem Auger

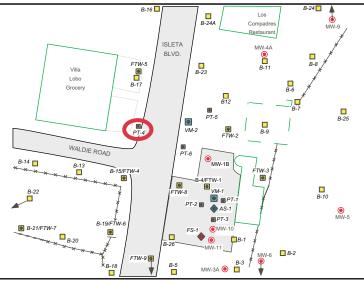
SAMPLING METHOD: Split Spoon

TOP OF CASING ELEV: NA DEPTH TO WATER: ~12' TOTAL DEPTH: 14'

CASING: Various lengths 1" Dia. Sched 80 PVC SCREEN: 2.5' Long 1" Dia. Sched 80 PVC (X2)

SURFACE COMPLETION: 12"X12" Concrete with Pad





USCS - LITHOLOGIC DESCRIPTION

Surface Conditions: Asphalt/road base ~4"

0.0'-2.0' (SM/ML) (5YR 4/6) Silty sandy clayey fine grained trace medium sands, soft, slightly moist, low to no plasticity, no odor, interval varies back and forth, (SM/ML), no odor.

2.0'-4.0' (SM/ML) (5YR 4/6) 100% Same as (0.0'-2.0') above. **4.0'-6.0'** (SM/ML) (5YR 4/6) 50% Same as (0.0'-0.2') above. **6.0'-8.0'** (10YR 6/8) 50% (SM) Silty fine sand, grades quickly to (SW) fine to medium sand, <1% fine gravel, slightly moist, no odor.

8.0'-10.0' (SW/SC) (5YR 4/6) 50% 0.0-1.0' Fine to coarse sands, fine to medium gravel, fine gravel <2%, medium gravel<1%, slight moisture, no odor, soft, possible (SC) \sim 2", 0.0-0.25 or cave-in, very fine silt/sand (10YR 3/6)

10.0'-12.0' (SW) (5YR 4/6) 70% Possible (SC) again, just like above, may be cave-in. (SW) Fine to coarse sands, fine to coarse gravel, about the same percentage, no odor, moist, at 12' becomes wet, as above, mostly medium to coarse sand, strong hydrocarbon odor.

12.0'-14.0' (SW) (5YR 4/6) 50% Same as 8.0'-10.0'.



CLIENT: **BCEHD** Well/Borehole ID: PT-5

DATE OF DRILLING: 02-02-01 LOGGED BY: S. Grietens DRILLER: Stan/Nevex

BOREHOLE DIAMETER:

Hollow Stem Auger **DRILLING METHOD:** SAMPLING METHOD: Split Spoon

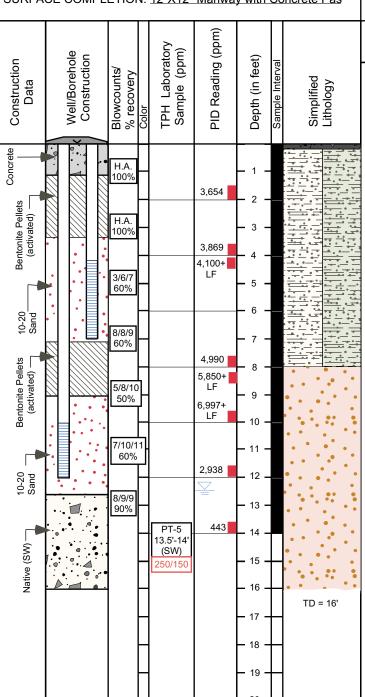
TOP OF CASING ELEV: NA **DEPTH TO WATER:** ~12.5'

16' TOTAL DEPTH: Various lengths 1" Dia. Sched 80 PVC CASING: SCREEN: 2.5' Long 1" Dia. Sched 80 PVC (X2)

SURFACE COMPLETION: 12"X12" Manway with Concrete Pas

Compadr MW-4A B-11 BLVD. B-17 Lobo Grocery WALDIE ROAD B-14 🔲 □_{B-20} ■ B-2

USCS - LITHOLOGIC DESCRIPTION



Surface Conditions: Asphalt

0.0'-2.0' (SM/SC) (N3) 100% Silty clayey sand sand, slightly moist, strong odor, no plasticity, trace to medium sands. 2.0'-4.0' (SM/SC) (N3) 100% Same as (0.0'-2.0') above.

4.0'-6.0' (SM/SC) (N3) 60% No medium sand, very fine silty sand/clayey sand, strong odor, moist.

6.0'-8.0' (SM/SC) (N3 - 5YR 4/6) 60% Same as (4.0'-6.0') above, color change at ~7.0', strong odor.

8.0'-10.0' (SW) (N7) 50% Fine to coarse sand, fine to medium gravel, odor, slightly moist.

10.0'-12.0' (SW) (N7) 60% Fine to coarse sand, fine to medium gravel, trace/some coarse gravel, moist/wet, strong odor.

12.0'-14.0' (SW) (N7) 20% Same as (10.0'-12.0') above. **14.0'-16.0'** (SW) (N7) 90% Same as (10.0'-12.0') above.



CLIENT: **BCEHD** Well/Borehole ID: PT-6

DATE OF DRILLING: 02-06-01 LOGGED BY: S. Grietens DRILLER: Stan/Nevex

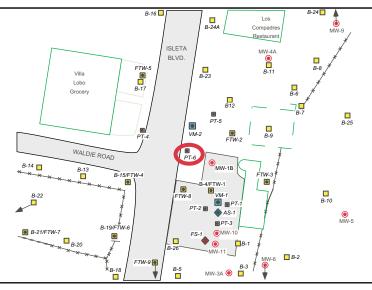
BOREHOLE DIAMETER:

DRILLING METHOD: Hollow Stem Auger

SAMPLING METHOD: Split Spoon

TOP OF CASING ELEV: NA **DEPTH TO WATER:** ~13' 16' TOTAL DEPTH:

CASING: 1" Dia. Sched 80 PVC Blank SCREEN: 1" Dia. 0.01 Slot Sched 80 PVC SURFACE COMPLETION: 12" Manway Reading (ppm) TPH Laboratory Sample (ppm) Well/Borehole Construction Data Construction Depth (in feet) Blowcounts/ % recovery Simplified Lithology 딢 H.A. 100% 1,041 Bentonite Pellets (activated) — H.A. 100% 2,246 7/7/6 75% 324 10-20 Sand 8/7/5 60% 1,186 Bentonite Pellets (activated) ─ 9/8/8 75% 4,068 10/10/9 75% 4,785 PT-6 12'-13' (SW) 10/4/3 13 75% 2 700 210 4,245 Vative Sands (SW)



USCS - LITHOLOGIC DESCRIPTION

Surface Conditions: Asphalt

0.0'-2.0' (SM/SC) (N3) 100% Clayey sand, fine to medium grained, soft, almost plastic, odor, slightly moist, soft to firm, no

2.0'-4.0' (SM/SC) (N3) 100% Same as (0.0'-2.0') above. **4.0'-6.0' 75%** 0.0'-1.0' (**SC**) (**N5**) Fine silty sand, trace medium/coarse firm, odor. 1.0'-1.5'(SM) Very fine silty sand (10YR 8/3) soft, slightly moist, odor, sharp contact.

6.0'-8.0' 60% (SM) Very fine silty sand, soft, slightly moist, odor, color grades back to (N5) at 0.8' (10YR) - 1.2' (N5).

8.0'-10.0' (SW) (N7) 75% Fine to coarse sands with fines, soft, slightly moist, odor, trace fine to medium gravel.

10.0'-12.0' (SW) (N7) 75% Fine to coarse sands with fines, fine to medium gravel, some coarse gravel, soft, moist, odor.

12.0'-14.0' (SW) (N7) 75% Same as (10.0'-12.0') above.

14.0'-16.0' (SW) (N7) 5% Same as (10.0'-12.0') above.



4/4/4

5%

15

16

17

18

19

TD = 16'

442

CLIENT: **BCEHD**Well/Borehole ID: **FS-1**

DATE OF DRILLING: 02-21-01 LOGGED BY: W. Brown

DRILLER: B. Davis/Enviroworks

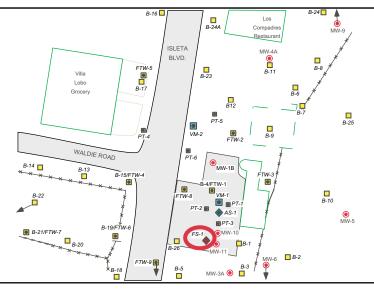
BOREHOLE DIAMETER: 8"

DRILLING METHOD: Hollow Stem Auger/Posthole

SAMPLING METHOD: Split Spoon/Posthole

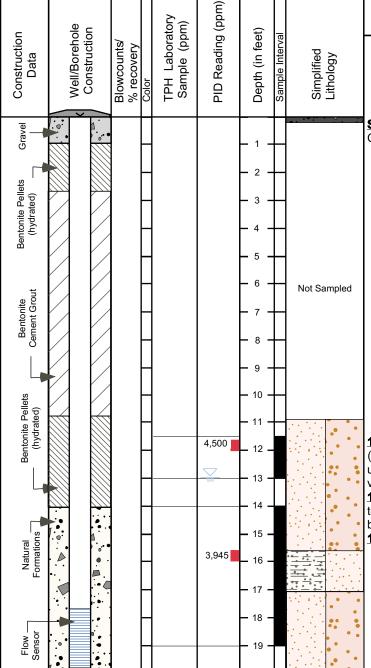
TOP OF CASING ELEV: $\frac{NA}{21}$ DEPTH TO WATER: $\frac{\sim 13'}{21'}$

CASING: 2" Dia. Sched 40 PVC Blank
SCREEN: Bottom of sensor at 19.7' BSG
SURFACE COMPLETION: 12"X12" Manway with Concrete Pad



USCS - LITHOLOGIC DESCRIPTION

Surface Conditions: Asphalt Cleared upper 3.5' with hand auger.



11.5'-13.0' Split Spoon 1.5' sample. 0.0'-0.4' Plug. 0.4'-1.5' (**SP/SW**) (**N5**) Light gray-brown, fine to coarse sand-mostly medium, water and hydrocarbon saturated at base, unconsolidated, very strong hydrocarbon odor.

14.0'-19.0' Core Barrel 1.0' sample. (**SM/SP**) Brown, very fine to fine sand with minor silt, water saturated, moderate hydrocarbon odor, unconsolidated.

19.0'-21.0' (Cuttings) Indicates (SP/SW).



APPENDIX B

Health and Safety Plan

1000 Lomas Boulevard NW Albuquerque, New Mexico 87102-1945 (505) 243-5494 • FAX (505) 243-5585

SITE HEALTH & SAFETY PLAN FOR THE OLD HORN SITE 430 ISLETA BLVD. SW, ALBUQUERQUE, NM DRILLING AND MONITORING WELL INSTALLATION

SITE DESCRIPTION

Site Location: The site location is in the south valley of Albuquerque, New Mexico on Isleta Boulevard four blocks south of Bridge Blvd.

Project Objective: Install soil borings and monitoring wells at a former gas station.

Site Description: The site is a former gasoline station that is presently occupied by an automotive service garage. No USTs presently exist at the site. No fuel dispensing is conducted.

PROJECT PERSONNEL

Project Team Leader: William Brown
Scientific Advisor: Stuart Faith
Site Safety Officer: Tim Chavez
Public Information Officer: Dave Strasser
Security Officer: William Brown
Record Keeper: Tim Chavez

Field Team Members: Rob Sengebush and Rodgers Environmental Services Drilling Staff

State Agency Representative: Tom Leck

All activities on-site must be cleared through the Project Team Leader.

ON-SITE CONTROL

William Brown is designated to coordinate access control and security on-site. The work zone perimeter will be established within a perimeter around the drill rig. No unauthorized person should be within the roped area.

HAZARD EVALUATION

The primary chemical hazard associated with the well installation is gasoline vapors. Gasoline is a mixture of several products. The primary constituents of concern and their associated hazards are identified below. Many of the hazards identified below are significantly small in quantity but should still be recognized as potential safety issues.

Substances Involved	Primary Hazards
Benzene	Extremely Flammable, Gives off Poisonous Vapor,
	Danger of Cumulative Health Effects
Toluene	Highly Flammable, Harmful Vapor
Xylenes	Harmful Vapor, Harmful by Skin Absorption, Flammable
1,2 Dichloroethane (EDB)	Highly Flammable, Harmful Vapor, Irritating to Skin,
	Eyes and Respiratory System
1,2 Dibromoethane (EDC)	Harmful Vapor, Toxic in Skin Contact
Ethylbenzene	Highly Flammable, Harmful Vapor, Irritating to Skin,
	Eyes and Respiratory System
Methyl Tert Butyl Ether (MTBE)	Extremely Flammable, Harmful Vapor, Irritating to Skin,
	Eyes and Respiratory System
Naphthalene	Moderately Flammable, Skin and Eye Irritant,
	Gastrointestinal Irritation

Hazardous Substance Information forms for these compounds are kept on file at the FEI office. They are available for review upon request.

Because of the chemical hazards associated with the gasoline vapors, no smoking or consumption of food and beverages will be permitted. The buddy system will be mandatory for personnel in the Work Zone at all times. If organic vapor levels exceed 300 ppm, respiratory protection will be required. Workers are cautioned to minimize skin contact routes of exposure.

Explosive vapors levels will be monitored as needed to insure worker safety. No open flames or ignition sources will be operated when explosivity levels exceed 1.5% in the Work Zone. No activities will take place in the Work Zone when explosive vapor levels exceed 15%.

The project scientist or safety officer will monitor all workers on the site for signs of heat stress and will ensure that adequate drinking water is available on-site. Workers that show signs of heat stress will immediately stop work, be placed in an air-conditioned vehicle and begin taking fluids. The worker's condition will be evaluated and evacuated for medical care as needed.

DRILLING EQUIPMENT HAZARD

The other site hazard is from mechanical drilling equipment. All non-essential personnel will keep a minimum distance of 50 feet away from the drilling equipment at all times. Hard-hats will be worn at all times when within the 50 foot radius. Steel toe boots and Level D protection are required during all drilling operations. New leather gloves will be worn when cutting core samples or handling exposed metal core ends. Safety glasses will be worn at all times during drilling, coring, or core cutting and extruding.

PERSONAL PROTECTIVE EQUIPMENT

Based on evaluation of the potential hazards, a Level D personal protection will be designated for the work zone.

Recommended equipment includes:

Coveralls / Long Sleeves and long pants (minimal skin exposure)
Safety boots/shoes

Optional equipment includes:

Hearing protection
Respiratory protection (half/full face respirators with solvent cartridges)

ENVIRONMENTAL MONITORING

The following environmental monitoring instruments shall be used on-site:

Combustible Gas Indicator to monitor flammable/explosive gas levels.

FID to monitor volatile organic vapor levels.

If monitoring indicates TLV levels exceed weighted averages, respiratory protection will be required in the affected areas.

EMERGENCY MEDICAL CARE

A person certified in first aid and CPR will be on-site during all work activities. First aid equipment will be available on-site. A first aid kit will be in the FEI field vehicle. Emergency telephone numbers:

Ambulance 911 Fire Dept. 911 Sheriff 911

Presbyterian Hospital Urgent Care Unit 462-7777

Hospital:

Presbyterian Urgent Care Unit, 3436 Isleta Blvd.; Directions – south on Isleta Blvd. approximately 3.5 miles to Rio Bravo. Located on the northeast corner of Isleta and Rio Bravo. (See attached map) The Urgent Care Unit emergency entrance will be in front. Follow signs to emergency entrance. ALTERNATIVE: Call 911 for ambulance transport.

STANDARD TREATMENTS FOR CHEMICAL EXPOSURES ARE:

Splashes of the skin

- 1. Flood the splashed surface thoroughly with large quantities of running water for ten (10) minutes.
- 2. If the situation warrants it, arrange for transport to hospital. Provide information to hospital personnel about the chemical responsible and first aid treatment administered.

Splashes of the eye

- 1. Flood the eye thoroughly with large quantities of gently running water from tap or eye wash for ten (10) minutes.
- 2. Ensure the water bathes the eyeball by gently pressing open the eyelids and keeping them apart until treatment is completed.
- 3. Arrange transport to hospital and provide information to accompany casualty on the chemical responsible and first aid treatment administered.

Inhalation of gases

- 1. Ensure personal safety. Immediately remove the casualty out of danger area into fresh air.
- 2. If the casualty is unconscious, check breathing. If breathing has stopped, apply artificial respiration.
- 3. Arrange transport to hospital and provide information on compounds responsible and first aid treatment given.

Ingestion of poisonous chemicals

- 1. If the chemical has been confined to the mouth, give large quantities of water as a wash. Ensure mouth wash is not swallowed.
- 2. If the chemical has been swallowed, give copious drinks of water to dilute it in the stomach.
- 3. Do not induce vomiting.
- Arrange for transport to the hospital. Provide information to accompany casualty on chemical swallowed and details of treatment given and possible estimate of the quantity and concentration of the chemical consumed.

EMERGENCY PROCEDURES (WILL BE MODIFIED AS REQUIRED FOR INCIDENT)

The following standard emergency procedures will be used by on-site personnel. The Site Safety Officer shall be notified of any on-site emergencies and be responsible for ensuring that the appropriate procedures are followed.

Personal Injury in the Work Zone: Upon notification of an injury in the Work Zone, the designated emergency signal is a shout. All site personnel will move to the south side of Highway 66. The Site Safety Officer will evaluate the nature of the injury and select individuals to assist in moving the injured person to a safe area if possible. The appropriate first aid will be initiated by the Site Safety Officer. A designated individual will contact the ambulance service and hospital (if required). No persons will reenter the Work Zone until the cause of the injury or symptoms has been determined.

Fire / Explosion: Upon notification of fire or explosion on-site, the designated emergency signal is a shout. All site personnel will rapidly evacuate the site at a safe distance from the involved area. The fire department will be alerted and all personnel will remain at a safe distance until the situation is resolved.

Personal Protective Equipment Failure: If any site worker experiences a failure or alteration of protective equipment that affects the protection factor, that person will immediately leave the Work Zone. Reentry will not be permitted until the equipment has been repaired or replaced.

Other Equipment Failure: If any other equipment on-site fails to operate properly, the Project Team Leader and the Site Safety Officer will be notified and then determine the effect of this failure on continuing operations on-site. If the failure affects the safety of personnel or prevents completion of the Work Plan tasks, all personnel will leave the Work Zone until the situation is evaluated and appropriate actions taken.

The following emergency escape route is designated: south across Highway 66 to the nearest pay telephone. In all situations, when an on-site emergency results in evacuation of the Work Zone, personnel will not reenter until:

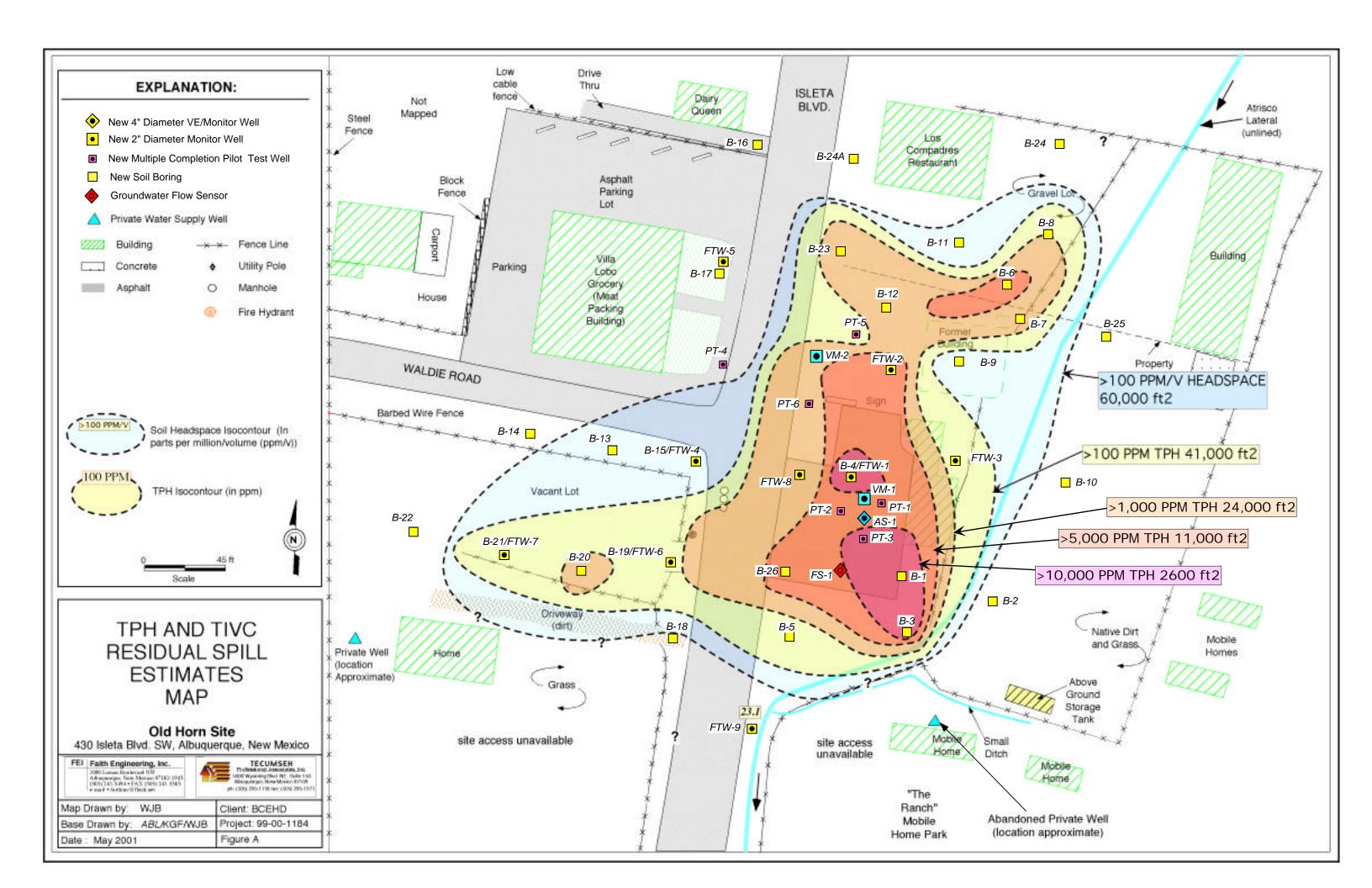
- 1. The conditions resulting in the emergency have been corrected.
- 2. The hazards have been reassessed.
- 3. The Site Safety Plan has been reviewed.
- 4. Site Personnel have been briefed on any changes in the Site Safety Plan.

All site personnel have read the above plan and are familiar with its provisions.

	Name	Signature	
Site Safety Officer:		9	
Project Team Leader:			
Other Site Personnel:			
•			
•			

APPENDIX C

Hydrocarbon Spill Mass Estimates



APPENDIX D

Laboratory Analytical Reports

Hydrogeologic Investigation

Old Horn Site
430 ISLETA BLVD., SW
ALBUQUERQUE,
BERNALILLO
COUNTY, NM

APPENDICES - VOLUME II

APPENDIX D (CONT.) - LABORATORY ANALYTICAL REPORTS